Medical Lib

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ON THE RELATIONS OF HEREDITY AND ENVIRONMENT, OF "CONSTITUTION" AND "CONDITION", TO PREDISPOSITION TO DISEASE*

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MEDICAL men in their studies of the origin of disease have, during the past fifty years, been much more deeply interested in external (or exogenous) than in internal (or endogenous) causes. This fact is by no means surprising for we have just passed through a period when studies of harmful agents emanating from without and researches directed toward combating their influences have been extraordinarily rewarding. I need only remind you of the triumphs of modern surgery in overcoming the effects of trauma, and of modern bacteriology, parasitology, immunology and chemotherapy in the control of infectious and parasitic diseases to make clear to you that exopathic considerations have largely dominated medical thought, medical research, and the practical activities of physicians and surgeons of our time.

Through the ages, however, from the time of Hippocrates downward, there have always been medical men, especially among the active practitioners, who have been impressed fully as much with differences in susceptibility to disease, differences in disposition, differences in powers of resistance to external noxæ, and differences in rapidity and completeness of recovery from disease or injury as they have been with differences in the external causes themselves. They have wondered why one of two persons similarly exposed contracted pneumonia while the other did not, why one man developed cirrhosis of the liver though his bibulous comrade who drank as much or more escaped, why one patient died of typhoid and another in the next bed recovered, why a fracture in one person healed quickly and that of another showed delayed union, or why several members of one family were phthisical when all the members of a neighbor's family remained hale and hearty. These discrepancies were not wholly explicable by differences in character of trauma, in virulence of invading micro-organism or in mode of exposure. They could be accounted for only by differences in the persons acted upon, that is to say by differences in disposition, either inherited or acquired. And hence, doubtless, must be sought the explanation of the undying popularity with the profession and with the laity of the conceptions of good and bad or strong and weak "constitutions".

With the rise of the natural sciences and the application of their methods of precision to the solution of medical problems, it was natural that medical investigators should give preference to researches that permitted of exact quantitative measurements. Ideas of constitution and of disposition could not, it was thought, easily be subjected to mensuration as a test of their validity and there was, accordingly, a tendency to put them aside in order to make room for etiological hypotheses more susceptible of mathematically accurate establishment as truth. There was certainly some justification for the harsh comment

*Address in Medicine at the Meeting of the Canadian Medical Association in Winnipeg, June, 1922.

of Germain See: "La disposition est un mot pour masquer notre ignorance." However, as Bauer has pointed out, the assumption of a constitutional disposition to a disease remained a convenient subterfuge for lack of knowledge only so long as it was adopted solely by exclusion and no scientific proof for it could be brought forward. Once the scientific basis for a doctrine of constitution had been established, the circumstances were altered and consideration of the pathology of constitution and of disposition became both legitimate and imperative. During the past two or three decades, thanks to exact studies of heredity and of development, the scientific foundations for a general and special pathology of constitution and disposition have been laid. Biologists, who during the previous century had concentrated their attention upon the origin of species (doctrine of evolution), have in the present century directed their researches more particularly to the origin of individuals (phenomena of inheritance and development). Through experimental studies of heredity and development in animals and plants they have accumulated data and established principles that mark the beginning of a new era. The knowledge that has been gained of those processes in forms of life below man is full of promise for a better understanding of human heredity and development. It justifies the hope that our ability to control these processes in human beings will from now on make steady growth. It has occurred to me, therefore, that an examination of some of the relationships of heredity and environment to predisposition to disease might afford interesting materials for a general address, such as I have been asked to make on this occasion.

The Processes of Development

The development of a human being resembles in all essential respects that of other animals. The laws of heredity and differentiation appear to be fundamentally the same in man as in lower forms. The female sex-cell (ovum) is fertilized by the male sex-cell (spermatozoon). The union of the two sex-cells (gametes) to form a single cell (oosperm) starts a new individual (zygote). Under the influence of a suitable environment, this fertilized egg-cell develops, stage by stage, into an adult human being or person; and as the body develops there is a gradual transformation of the simpler reactions and activities of the oosperm into the extremely complex and varied reactions and activities (exhibited as instincts, habits and intelligence) that characterize maturity. An understanding of the form and functions of the adult can be properly understood only by tracing them back to their origins, paying close attention to each stage of their differentiation from a generalized to a specialized condition. In this differentiation two sets of factors are concerned: (1) intrinsic factors represented by the organization of the oosperm (heredity), and (2) extrinsic factors represented in the surroundings of the developing organism (environment). The development is determined mainly by heredity, though it is modified (stimulated or inhibited) by the environment.

The Nature of Heredity

Knowledge of heredity has made great progress since biologists began to study the traits or constituent characters of organisms singly instead of limiting their attention to resemblances and differences of whole organisms considered as indivisible units. Species characters and racial characters are all inherited; they are firmly fixed by heredity. Many individual characters (structural and functional) are also known to be inherited, though some are due to the environment and are not inherited. All the possibilities for development of body and mind are inherent in the germ-plasm or idioplasm of the oosperm; the possibilities that become realities in the developed person are dependent for their realization upon stimuli originating in the surroundings. The "determination factors" of development are contained within the germ; the "realization factors" of development lie in the environment.

Studies of inheritance by the methods of Mendel have thrown great light upon the transmission of hereditary characters. They have shown (1) that certain characters are inherited as a whole and are not further subdivisible (principle of unit characters), (2) that when contrasting unit characters are present in the two parents, one becomes dominant and the other recessive in the offspring (principle of dominance), and (3) that every single germ-cell is "pure" as regards any given unit character, even though it be derived from a hybrid parent (principle of segregation). Though these so-called Mendelian rules have had to be modified somewhat, their application is apparently as important for biology as the atomic theory has been for chemistry. They have permitted the analysis, by experiment,

of the inherited constitution of organisms; by applying them it has been found possible to determine the true resemblances and the true differences of many animals and plants. They probably hold for man, though since man is a slow-breeding polyhybrid, has few children, and is relatively inaccessible to experiment, the study of his inheritance must always be less satisfactory and less accurate than studies of inheritance in lower forms. But there is in man as in animals a cellular basis to heredity, and in man the same distinction between germ-cells and soma-cells can be made. Furthermore, similar chromosomal mechanisms are concerned, the inheritance of certain unit characters is similarly sex-linked, and mutations likewise occur and are inherited. We can feel tolerably certain, therefore, that the general principles of heredity and development that have been and are being established through animal experiment are broadly applicable to man and can safely be used as foundations for medical studies.

Genotype, Paratype and Phenotype; Constitution and Condition

From what has been said, it is clear that we should, by abstraction at least, distinguish sharply in every organism (including man) between the part due to inheritance and the part due to environment. The fertilized egg-cell (oosperm) represents through its chromatin the inheritance uninfluenced by environment. It begins, however, immediately to be influenced by its surroundings (substances and energies) and to undergo changes as a result. If development proceed normally, the reactions between the germ plasm and the environment gradually lead to the fully-developed organism, in man the "realized adult person". To this realized organism the term 'phenotype' has been applied, whereas to the germinal material with all its hereditary peculiarities has been given the name 'idiotype' or 'genotype', since this contains the elements (genes) that determine the reactions that give rise to the characters of the developed organism. Now the genotypic or idiotypic part of a phenotype that is the part due to heredity may well be designated 'constitution', whereas the rest of the phenotype, the part of it due to environmental influences, may well, as Tandler has suggested, be called "condition", or, as Kahn has recommended, "constellation". The phenotype is, thus conceived, the resultant of the interaction of 'constitutional' factors with 'conditional' influences.*

If we adopt these definitions, the conception of "constitution" is purely hereditary in character, It is, as Grote puts it, "the sum of all those morphological, functional and regulatory properties of the soma and of the psyche that are particularly determined at the moment of fertilization and that become realized in the course of personal development." The conception of "condition" is, on the other hand, purely non-hereditary in character. It includes the qualities that are acquired during development and in the course of the personal life (owing to food, geographical location, education, social position, disease, etc.), qualities that are not transmissible to the offspring since they are not represented in the germplasm. To repeat, then, according to the above definitions the total qualities of the realized person (phenotype) are partly "constitutional" and partly "conditional" in origin. But if it be desired to use the term "constitution" in a broader sense, we may speak of the phenotype or phenotypic constitution as consisting of two parts:—(1) a genotypic or idiotypic constitution (inherited), and (2) a conditional or paratypic constitution (acquired).

The Clinical Significance of the Conceptions of Constitution and Disposition

We who are clinical workers are daily occupied in the recognition of health and of disease in human beings. We study persons as wholes and we study also their constituent anatomical systems, the functional activities of those systems, and the regulatory mechanisms that control and integrate them. We try to distinguish between what we call "normal" and what we

*Some contemporary writers use the term 'constitution' in a different way, including in it the whole organismal make-up ("genotypic or idiotypic constitution" plus "condition"), differentiating thus between 'genotypic or idiotypic constitution' (hereditary) and 'conditional or paratypic constitution' (acquired). I have up to now been inclined to reserve the term 'constitution' for the germinal and the term 'condition' for the environmental contributions to the body make-up. Nevertheless the objections raised to such a restriction to the meaning of the term 'constitution' are formidable. For we have to deal in reality with developed individuals, composed of cells and tissues and their functions integrated into persons. We can distinguish abstractly, but only with great difficulty practically, between what is inherited (genotypic constitution) and what is acquired (condition or constellation) in such persons. For the qualities of persons are not additions of condition to constitution, they are amalgamations of inherited and acquired. Thus vaccination gives an acquired immunity against smallpox but this acquisition presupposes a definite inherited constitution!

call "abnormal". But the term "normality" has a different meaning, according to the particular standard (norm or type) with which structures and functions are compared. The anthropologist will have one standard in mind, the morphologist another, the physiologist another and the moralist still another. As clinicians, we regard as "normal" a person whose vital responses correspond completely to those biological needs that depend upon his collisions with a physical, chemical, psychical and social environment. When there is incongruity between vital responses and personal needs for biological performances, the person may be regarded as "abnormal". Or if one desire to avoid the terms normal and abnormal he may (with Grote) adopt the expressions "responsive" and "irresponsive" for persons respectively whose reactions correspond, or do not correspond, to their individual biological needs. This idea of "personal normality", or of "responsivity of the person" is clinically of real value, though it differs of course from the notion of normality of type based upon statistics or averages as well as from the notion of normality as identity with an ideal type—two fictive conceptions that, owing to the multifariousness of human differences, are of relatively little value for the clinic.

Considerable "variation" (morphological, functional, regulatory) in human beings is compatible with health, though each variation may entail some special individual predisposition to disease, since the variation may limit the powers of adaptation to the environment. The study of 'personal variants' becomes therefore of great importance, for an acquaintance with these and their corresponding dispositions to disease will be essential for the development of methods of special as contrasted with general prophylaxis. Morphological personal variants (exhibited as differences in habitus), functional personal variants (manifested as differences in biochemical composition or differences in modes of reaction) and evolutive and involutive personal variants (characterized by differences in times of reaching the developmental acme or in times of appearance of the phenomena of senescence) must always interest clinical workers who study single persons in the search for clues for disposition to disease and for criteria that will serve as guides for preventive intervention. A morphological variant exhibiting an asthenic habitus is believed to be, other things being equal, more susceptible than others to pulmonary tuberculosis; a functional variant who metabolizes or eliminates purins slowly is in danger of paroxysms of gout; an evolutive variant who carries his infantile or adolescent modes of reaction and adaptation into adulthood runs the risk of psychoneurotic failure of social adaptation; and an involutive variant who shows a premature canities, an early arcus senilis of the cornea, or a premature menopause may, a little later on, show other signs of a partial or universal senilism or become the subject of a pathological abiotrophy, a progressive atherosclerosis or a chronic hypertrophic osteoarthritis.

So long, however, as these personal variants are adequately responsive, we do not call them 'diseased'. We clinically designate a condition as disease when the person becomes irresponsive, that is to say when his powers of adaptation become incongruous with his personal needs in the way of functional performance and endurance.*

The revival of the study of constitution emphasizes the individuality of each patient. It takes especially into account the structural and functional differences that distinguish persons from one another. No two persons are precisely alike. Each human being is a unique person; no-one just like him ever existed before; nor will anyone just like him ever exist again. The student of the pathology of constitution will ask himself when he studies a patient: Why does this particular person sicken of this disease? Why does the disease in him follow this particular course? Such questions are in line with a laudable clinical tendency, that of individualization in both diagnosis and therapy.

Disposition to disease in a given person may depend upon abnormalities of the genotype or idiotype chiefly, upon abnormalities of the paratype chiefly, or upon a combination of both. The example usually chosen for illustration is pulmonary tuberculosis. From the standpoint of *inherited constitutional or genotypic disposition*, a person with a long, narrow thorax and voluminous lungs (habitus asthenicus) is believed to be much more liable, other things being equal, to progressive pulmonary tuberculosis than is a man with short neck and thorax and small lungs (habitus apoplecticus). From the standpoint of *non-inherited conditional or paratypic disposition*, a person who has recently recovered from measles or whooping cough is, other things being

*Though this definition of "disease" is practically useful in clinical work, a widening of the meaning may be desirable for anthropology and for general biology.

equal, in greater danger of pulmonary tuberculosis than is another. A person with asthenic habitus convalescent from measles has a *combined genotypic and paratypic disposition* to pulmonary tuberculosis, partly inherited, partly acquired, and is, accordingly, doubly endangered.

A growing interest has been manifested since the beginning of the new century in the analysis and classification of human phenotypes. French observers have attempted to divide developed human types into four main groups: (1) a respiratory type, (2) a digestive type (3) a muscular type and (4) a cerebral type, on the ground of external habitus. Clinicians in various countries have described several types of general anomalies of phenotype, for example, the status asthenicus (Stiller), the status thymico-lymphaticus (Paltauf), the status hypoplasticus (Bartel), the status exudativus (Czerny), the status arthriticus (*arthritisme* or *herpetisme* of French writers). Such general anomalies of body make-up are believed to predispose to special forms of organic and functional diseases. Interesting as these attempts to establish definite types of anomalies of constitution are, they are far from exact scientific establishment. The several anomalies mentioned show manifold overlappings; it would seem as though every new investigator in this domain felt it incumbent upon him to describe a new 'status' under a new name, even though it appeared as only a slight modification of a status that had been earlier described. As J. Bauer has emphasized, the objection to be raised to these attempts at systematization of "states" lies in the fact that clinically so many mixtures of the "states" are seen and in such kaleidoscopic confusion that, for the present at least, they defy attempts at satisfactory classification. The reason I think is obvious. Clinicians have been trying to deal with complex wholes of constitution before knowledge of the simpler elements has sufficiently advanced. Clinical studies of the pathology of constitution and disposition are suffering from the limitations that characterized the studies of heredity by biologists before the application of the experimental analytical (especially the Mendelian) method.

Following the lead of modern biology in the attempt to deal with the inheritance of constituent characters rather than with that of organisms in their entirety, Davenport and Plate have catalogued over sixty pathological human traits that they believe to be inherited in Mendelian fashion. Some of these appear to be dominant, some of them recessive. A number of them, like hemophilia and color blindness, seem to be sex-linked. Though only a beginning has as yet been made in the scientific analysis of phenotypes (and of their genotypic and paratypic constituents) in relation to disposition to disease, it is certain, I think, that studies of this sort must soon increase in numbers and in clinical importance. An especially fruitful field is that of dispositions depending upon disorders of the endocrine functions, both those of genotypic and those of paratypic origin.

There can be no doubt that, as knowledge of constitution and of disease disposition grows, much will be gained for prophylaxis, therapy in general will become more individualized and, perhaps, we shall also make some advance in devising practical eugenic measures that will lead gradually to the betterment of our race.

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SOME PHASES OF DYSTHYROIDISM*

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WITH the introduction of the newer laboratory methods for the study of diseases of the thyroid gland, a new impetus to investigation has been introduced into this fascinating field. Yet we fear that these laboratory methods have a distinct tendency to outweigh the clinical history and physical findings and thereby to prejudice the physician's conception of the underlying pathology of the disease. It must be a common experience for the physician, who has referred to the metabolic station a patient with a suspicious history of thyroid disease to receive a report of a normal basal rate. He is too apt to accept this report as final evidence against his well founded clinical diagnosis. The question naturally arises is such an attitude of mind justifiable? Are we to accept, as axiomatic that a normal basal rate means that the symptoms of the case under investigation are not due to thyroid intoxication? All of you, I think, will agree that the very most a normal basal rate can signify is an absence of a marked thyroid toxicity. Plummer and Boothby, I believe, insist that the term 'hyperthyroidism" implies necessarily an increased metabolic rate, and that conversely a normal rate excludes hyperthyroidism. It has been generally accepted for some time that the disease known as exophthalmic goitre is due to hyperthyroidism, *i. e.*, an excessive excretion of normal thyroid hormone. Accordingly, in this disease the increase in metabolic rate, as is usually found, has been assigned to this excessive excretion. Even if this latter contention be true, is it necessary to suppose that such an excessive secretion is present in the early states of the disease or indeed present in measurable amounts at all times during the fully developed stage? In other words one may ask is the basal rate to be the sole criterion of the absence or presence of a disordered function of the thyroid gland? Some of us believe that this is too much to expect of any "method of precision", as the basal rate measurement purports to be, and we accordingly would depend rather on the clinical history and physical examination in an obscure case than upon any *one* laboratory method, valuable as that method may be in the majority of instances.

If it were merely a matter of terminology as some would suggest, we might speak of thyroid disease with a high rate as hyperthyroidism, thyroid disease with a normal rate as dysthyroidism, and thyroid disease with a low rate as hypothyroidism. We, however, would be even more radical and adopt the suggestions of Janney and Cushing to discard the term "hyperthyroidism" as a synonym of Graves disease in favour of "dysthyroidism", even when speaking of the fully developed stage of Graves disease. The reasons for this change of terminology we have outlined elsewhere. (1) Whether this suggestion be acceptable to all of you or not, we are not ready to admit that the classification of cases of thyroid disease with normal rates as "dysthyroidism" permits one to regard this group as essentially

*Read at the annual meeting of the Canadian Medical Association, Winnipeg, June 23rd, 1922.

different from those with a high rate. By which attitude of mind we do not intend to be obstinately academic, but to assert our belief that an increased basal rate signifies merely a more marked degree of toxicity (hence more measurable by one method of laboratory examination) of the same underlying toxæmia, and not a different disease entity.

Perhaps we can make our attitude clearer by now reporting a group of twelve patients which has been studied during a period of twelve months in a medical clinic with the usual high incidence of toxic adenomata and Graves disease that obtains in the middle west.

When I submitted this subject last March to your president I was not familiar with two of Goetschs papers (2) on an analogous group, nor had I heard Dr. J. L. Miller's paper (3) before the Association of American Physicians, nor read Hamilton and Lahey's article (4) which has just appeared. Our study of this particular group has been going on for the past year or two synchronously with those of the above mentioned writers; but what is of especial interest the clinical pictures depicted in all four papers is so similar as to suggest that there is a modicum of truth in our conclusions.

To describe this group in detail is surprisingly easy. First as to sex incidence nine of our twelve patients were females, a ratio nearly identical with that of exophthalmic goitre in the hospitals of America. (1)

Secondly, the average age of the group was twenty-eight years and two months with a range of from seventeen to forty years—an average age not much below that of exophthalmic goitre. The slight difference between the two groups, is due, we believe, to the fact that we are dealing with the earliest manifestations of thyroid intoxication.

The third point that we would emphasize is that six of the series had long been treated for pulmonary tuberculosis and had spent some months at least in the state sanitarium. Of the others, three were sent to us with the diagnosis of neurasthenia, one as colitis, another as "goitre" and one as "hyperthyroidism".

When we turn to the family history, we find in none a history of neurasthenia or other functional nervous disease. Three, however, had relatives with goitre, while a fourth patient had a father with Graves disease. In five families tuberculosis had occurred, but in only one was a sister or other member of the present generation affected.

Probably the most striking thing in the history of the present illness was that in all twelve cases the onset was sudden and definite; in most instances an exact date was volunteered, and in practically all the actual month was specified when the symptoms were first noted. This sharpness of the onset is also emphasized by Hamilton and Lahey, who contrast it with the vagueness of the onset of neurasthenia and allied states.

The duration of the symptoms varied from one month to five years with an average for the group of two years and one month. In other words the syndrome is not, by any means, transitory. The symptoms of the entire group are strikingly characteristic of disturbances of the autonomic nervous system. Under this heading we would include all symptoms due to an abnormal stimulation of smooth muscle, heart muscle and the secretory glands.

In this particular syndrome the ocular symptoms are decidedly in abeyance, as in only one patient was a slight degree of unilateral exophthalmos present, although in five Joffroy's sign and in three Stellwag's phenomenon were noted.

In marked contrast was the constancy with which sweating, palpitation of the heart, dyspnœa, hoarseness, nervousness, weakness, fatigability, emotional instability, insomnia, præcordial or abdominal pain, anorexia and even occasionally vomiting, diarrhœa, nocturia and pollakiuria, were mentioned in the anamnesis. Five of the eight women complained of varying degrees of dysmenorrhœa.

Upon physical examination there was evidence of loss of weight in all but one patient, the amount ranging from three to forty pounds, an average of roughly fifteen pounds for eleven of the group. In only one case was the weight stationary.

The thyroid gland in every patient was considered as slightly enlarged, though careful palpation was sometimes necessary to determine this slight grade of hypertrophy. The consistency of the gland was usually firm and its surface smooth; once only was the surface noted as granular. The thrill and bruit, so characteristic of the thyroid of Graves disease, were both noted on one examination in three cases, but were absent on another; in one case the bruit only was detected. In the two patients in which the gland was examined at operation the surgeon noted that the peri-glandular tissues were firm and

adherent to the gland capsule, while the colour of the gland itself was whiter than normal; in one case it seemed unduly vascular. It is only fair to state that both these glands had been submitted to one or more courses of X-ray therapy.

The characteristic fibrillary tremor was present to a marked degree in all but one patient, and in the latter was equivocal. In addition in several there was a coarse tremor resembling that seen in chronic alcoholism.

The skin was invariably fine, satiny, moist and exhibited varying degrees of dermatographia, flushing and transitory erythemata—in short all the signs of a vasomotor instability.

The pulse was very labile, ranging from the normal to 100, 110 or even 120 beats per minute. This tachycardia, though usually occurring after physical exertion, was just as likely to appear upon emotional stimulation. The temperature too, showed invariably slight elevation, though by mouth it was never recorded above 100° F.

The blood pressure revealed a slight increase in the systolic phase in fifty percent. of the group; the diastolic pressure was usually normal or a little below. In other words, there was no marked change in the pulse pressure.

The blood count was normal as far as the hæmoglobin and red cells were concerned, but a leucopenia was common and in eleven cases there was a relative lymphocytosis ranging from 27% to 46%, highly suggestive of the picture found in the fully developed stage of Graves disease.

We think the above description of the clinical picture would justify an expectation of an abnormal basal rate, yet this expectation was far from being realized and it is largely on account of this negative report that we are drawing your attention to this clinical syndrome. Seven of the patients revealed rates within the normal figures of −10 and +10%; two cases with only one reading (apart from the usual trail one) read +14 and +15%; figures nevertheless distinctly below our expectations, though it is true just above the normal. Two other patients gave a slight increase (+11 and +15%) on one reading, and normal rates on another occasion. The twelfth case on the first reading gave the distinctly high figure of +34.8% but three weeks later and again three months later it was well within normal limits (−1.8%) though the symptoms were only slightly ameliorated.

It seemed to us evident, therefore, that with patients whose symptomatology of a disturbed autonomic system were so pronounced, and whose B.M.R. was so consistently below expectations, some other laboratory diagnostic measure must be relied upon for support.

Accordingly, recalling the constancy with which the carbohydrate metabolism is disturbed in exophthalmic goitre, we tested the sugar tolerance in ten of our series. The usual method was followed, and it is not necessary to describe it here. Five or 50% of our cases showed both an alimentary hyperglycæmia and glycosuria; while one other showed a distinct hyperglycæmia, but no glycosuria. Three were negative for both hyperglycæmia and glycosuria. In other words, this test was positive in a much higher proportion of cases than was an increase of the metabolic rate.

Finally we tried the susceptibility of five of our patients to the subcutaneous administration of adrenalin. This test is considered by Goetsch (1) to be present in all cases of so-called hyperthyroidism though not necessarily pathognomonic of the disease, being merely an indication of hypersensitiveness of the sympathetic nervous system. Be this as it may, it was positive in varying degrees in all five of our cases, but in one of these was decidedly atypical. One of the patients (whose B.M.R. was −3.5%) gave a very typical reaction in all respects and developed glycosuria which was present for several hours.

Unfortunately, we had not commenced the Kottmann test (5) until April, 1922, so that only two of our cases have been submitted to this laboratory test, one being positive, though the rate was only −4.5 to +1.3%, and the other negative with a rate of −9%. This test depending as it does upon the physical-chemical activity of some theoretical colloidal substance in the serum of the dysthyroid patient, may prove of considerable value in the diagnosis of this border line group.

Differential Diagnosis: We feel that such terms as psychæsthenia, neurasthenia, neurocirculatory asthenia and cardiac neurosis will not suffice to describe this group of cases. Some of them may belong to the disease picture described by Goetsch under the name "diffuse adenomatosis of the thyroid gland". By this he means a syndrome closely resembling our picture, but in which thyroidectomy has been followed by a very definite improvement. Further, the thyroid gland presents a definite, and at times a very marked increase in the interstitial tissue, together with increased amounts of lymphoid tissue and an associated hypoplasia of the

primary alveolar or acinar epithelium. The interstitial tissue is not aggregated into nodules, but is scattered diffusely throughout the gland. While this pathological picture yet lacks confirmation, as far as I know, (and unfortunately we ourselves have not had the temerity to advise thyroidectomy in our cases) it sounds plausible and very attractive, coming as it does from such a careful student of the thyropathies.

Some clinicians might assign this symptom-complex to a hyperadrenalism or hyperchromaffinism. Of course we must agree with Barker (6) that "there is some evidence to support the view that certain cases of tachycardia with tremor and without struma are sympathicotonic states due to hyperchromaffinopathy rather than to hyperthyroidism." With Hurst, (7) we are also in accord when he writes that "many of the so-called *formes frustes* of Graves disease—emotional patients with tachycardia, vasomotor instability, excessive sweating and tremor, but without any marked enlargement of the thyroid or exophthalmos, and some cases of so-called idiopathic hypertension in nervous individuals are probably of this nature—*viz.* functional hyperadrenalism—hyperthyroidism."

We reluctantly admit, therefore, that some of our patients might be classified under this theoretical heading, but because of the prompt response to well recognized thyroid management in two at least, we cannot concede that this terminology will embrace the entire group.

Treatment has been limited to ligation of the superior thyroid arteries in two cases with marked symptomatic improvement in both and a gain of twelve and fifteen pounds, respectively, in six months time. One of these patients has returned to her nursing profession on part time. In the future we shall unhesitatingly urge a partial lobectomy as the procedure of choice.

In five other cases radiation with the roentgen ray or radium gave less distinct but still definite improvement. Five other cases either refused to stay for treatment or were discharged on some placebo, with the hope that they will return at some future time for further study and observation.

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Hypofunction and Hyperfunction of the Ductless Glands.—No single phase of endocrine dysfunction, A. J. Carlson, Chicago, asserts, is satisfactorily worked out today, either clinically or experimentally. He presents the established facts and what appear to be obstacles to progress—baseless speculation and uncritical practice. The credit for progress made and the blame for errors committed are shared by the clinical and laboratory groups. Failure to recognize the complexity of every endocrine problem is a serious obstacle to victory. Following the hormone theory alone may, in the case of some of the ductless glands, lead way off the main road. Carlson believes that much of the glandular therapy of today, however harmless to the patient, injures the good name of the medical profession with intelligent laymen. Carlson says: "We cannot practice quack methods and escape the just censure of society. The quack diagnoses every ailment with ease, and offers remedies for every disease with assurance. The good physician knows that he is neither omniscient nor omnipotent in the field of disease; and the educated layman knows this as well as the physician. Then, why pretend? Bluff may succeed for a time, but honesty is better for society; and what is best for society is best for the medical profession."—*Jour. Am. Med. Associa.*, July 8th, 1922.

THE STUDY OF SYMPTOMS

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EVERY art tends to be destroyed by the machinery which it creates; the tools of the trade may become more important than the trade itself. There is no lack of examples and perhaps our legal friends would agree that it often seems as if the machinery and procedure of the law have come to mean more than the basic principles of justice. Medicine is no exception and it seems worth while considering whether we are not in danger of making more of the machinery than of the art itself. It is a commonplace to dwell on the increasing complexity of medicine and to point out the difficulty of keeping up with all the advances. For the majority of us who have dates of the last century on our diplomas there is difficulty in understanding some of the work published to-day. The youngsters speak a language which we have not learned and perhaps, for our comfort be it said, this has been true of many previous generations.

For the majority of the profession the chief object is to care for the sick and to prevent disease. Naturally we desire to have every aid in doing this and many of these are complicated, requiring special training and elaborate apparatus; witness the Wassermann reaction and the electrocardiograph. But why should we stand in such particular reverence before them? They may be of the greatest assistance and a proper diagnosis may be impossible without them, but they should be used and kept in their place. An example of the placing of the Wassermann reaction in a position which it is not worthy to occupy was seen in the case of a patient with clear signs of syphilis of the liver who was left without treatment because his Wassermann reaction was negative. From the electrocardiograph we have gained material aid, but much of the knowledge obtained from it we can apply at the bedside by the use of our own senses.

It is a constant struggle for teachers to keep their students from making more of the machinery than of the art, and there is a certain type of student who, when asked, for example, the diagnostic points of some thoracic disease, answers first that an *x*-ray examination should be made. This may be necessary and may be the last court of appeal, but that is no reason why the usual methods of examination should not be carried through first.

One unfortunate result of this habit of mind is that the individual's own powers of observation and reflection atrophy through disuse. Trusting to a mechanical or laboratory method brings its punishment—the individual can do no other. Perhaps the statement that the powers have atrophied through disuse is not always correct—they may never have been present. If this is the case it may be difficult to do much, but for the majority the matter is largely one of training and here the teachers of medicine have a heavy responsibility. It is both an active stimulus and at the same time a sobering responsibility to think that the example and methods of a teacher have such a wide-reaching influence. How far away from the proper use of their own powers of investigation men may travel was brought home to me on a recent examination of the National Board in which I was acting as one of the examiners in clinical medicine. Four men in their examination of a patient's circulatory system, began by listening to the heart with their stethoscopes. In their discussion of the patients it came out that these men were all able to interpret correctly abnormal electrocardiographic tracings, but not one was able to examine a heart properly. For these men the machinery was more important than the heart itself.

In clinical medicine we have many diverse problems, some easy and some difficult. Wherein are we most apt to fail? It is easy to understand that any of us may be puzzled by some obscure rare case, of which we have never seen an example. Such must always occur, but I wish rather to dwell on the errors made in what may be regarded as comparatively simple diagnosis. It has been interesting to find what common condition has been most frequently overlooked in patients seen in consultation. It is the presence of fluid in the pleural cavity and you may well ask why this should be. The answer lies partly in the frailty of human nature, for it is rarely due

to lack of knowledge. This is a condition in which the use of our own senses and brains is all that is necessary—occasionally the help of a needle may be required, but very rarely —and an *x*-ray examination should be a necessity only in a very exceptional case. Here if we depended on our own faculties and used them there should be few errors. You do not need to be reminded of the saying that "more mistakes are made by not seeing than by not knowing."

We all agree that thoroughness and efficiency in our every day work are to be striven for in every way—not only for the good of the patient but for the sake of our own development and the reputation of the profession. Careless work harms all of them. How are we to reduce it? You may throw the burden largely on the training given to students and so on the teachers and properly to some extent. If a student has not been taught proper methods it is difficult for the majority to acquire them afterwards. I am willing to accept the responsibility of the teacher, but never forget that he has to deal with diverse material and has always the problem of deciding whether he will give attention to the better or poorer students in his groups. It is not an easy decision.

This brings me to the subject of my address—"The Study of Symptoms."* If we are to improve our efficiency in caring for the sick we must endeavour constantly to improve our ability to recognize what we have to do. In some quarters if one insists that accurate diagnosis must go before proper treatment he is termed a therapeutic nihilist. In which class—if that be the qualifying condition—most of us would be proud to place ourselves.

My feeling is that one very important thing for the profession to-day is to make the effort to get back to fundamentals. After all the essential things do not change. Proper methods and thoroughness are as important to-day as they were fifty years ago and as they will be fifty years in the future. The great majority of diagnoses have to depend principally on the proper use of our own faculties. Much of what comes to us as raw material to be fashioned into a correct diagnosis is in the form of the patient's account of his symptoms. This brings one naturally to the problem of obtaining these symptoms. It is very evident that there can be no complete study of symptoms until they have been obtained, so that if we expect to use them properly we must first obtain them to work on. This has to do largely with the question of the history.

How can we ensure the best stock of material to work with? This is not intended as a discourse on history taking but some words on it may not be amiss. How many of us take a better history to-day than we did a year ago? This should always be our aim. Three things stand out, patience, thoroughness and system. With this goes a training in examination and cross-examination as thorough as any lawyer should have. Naturally we do not have a hostile witness as a rule. I have sometimes thought when listening to a lawyer examining a witness that he might have been more skilful if he had taken some medical histories. Patience is required, for we know how garrulous and how stupid many patients are. Thoroughness and order are necessary that no point may be missed. It is always embarrassing for a consultant to elicit some point in the history which the man in charge has missed. To his indignant comment "You never told me that," comes usually the answer, "You never asked me." System means as much as anything in our work generally. The enquiries have to take in every possibility so that none may be missed.

It is a constant exercise in one's powers of adaptation and knowledge of human nature to suit the method of history taking to the individual. In this connection I often think of Alan Breck in Stevenson's *David Balfour*, and his handling of people. You will remember how he discussed various ailments with the auld wife, of whose discourse on symptoms Stevenson says: "Sometimes it was merely dull, sometimes both dull and awful, for she talked with unction." Later came the admonition from Alan to David: "What does your auld wife mind now? A fine, canty, friendly, cracky man that suffered with the stomach, poor body, and was real taen up about the good brother. O, man David, try and learn to have some kind of intelligence." The last sentence might be applied to all of us in our history taking.

One thing which always impresses me is to have several men take the history of the same patient at different times so that each man is doing it without knowing what the other has obtained. It is an interesting study to compare the results and surprising how much difference

*The term symptom is used with various meanings but here it is employed in the sense of the complaint made by the patient, as opposed to the objective findings.

very frequently is found. There is no doubt that at times the taking of the history seems more or less of a bore, and something which is to be got through with as quickly as possible. To my mind the one who does this loses much, not only in handicapping himself in making a proper diagnosis but in missing a great part of what should be a most interesting process. In this we are studying what may be the most important symptom of all—the patient himself. The history should include that of the patient himself as well as that of his disease. The importance of this needs no emphasis, and it should be kept in mind with reference to some of the forms of "group medicine" which have become so popular. In some of these apparently no one individual really establishes personal relationship with the patient; no one studies him as a personality. The reports from some of them give abundant evidence of this. Remove the personal relationship and you no longer practise an art; you drive a trade.

Much has been written by lawyers regarding examination and cross-examination, and while of course this is more spectacular when done in open court, each one of us has the opportunity to show his ability with every patient interviewed. The more stupid the patient and the more difficult it is to get a connected history, the more we should pride ourselves on obtaining the best possible result. It is never safe to allow one's attention to relax even when the most garrulous patient or one of his family is holding forth, because one never knows when an essential point may be brought out. Some little remark may give the key to the whole situation, as seen in the case of a patient who had an extremely talkative wife from whom words poured in an endless stream. She happened to let fall a chance remark regarding a curious habit which her husband had when in bed of having the bed clothes turned up at the bottom so that his feet were exposed. She mentioned it as a joke on him, but this remark gave the clue to an otherwise difficult diagnosis.

The art of diagnosis represents the solving of a problem, and this should always be of interest. What seems the most simple case may contain unsuspected difficulties, and the good rule of distrusting the obvious should always be before us. Naturally we wish to improve our abilities in diagnosis, and in this it is an advantage to approach each patient as representing an unsolved problem in which our powers are set against the unknown. It should be regarded as an intellectual problem much more often than it is. If to the routine of the day's work the intelligent curiosity of interest can be added much is gained.

There is one interesting exercise which may be carried on during the taking of the history—the noting of possible diagnosis. As one goes on this or that diagnosis comes as a possibility and can be put on a mental list. It is a good training in the value of symptoms to check these up later with the findings. It is evident that if ten possibilities are suggested during the history taking there is less chance of overlooking the condition present that if only five possibilities occur. Not that this supports the making of a diagnosis from the history. There is a pernicious habit which has been too evident in some quarters and is one to be strongly criticized. It is easy to regard a history as diagnostic of a given condition but not conducive to accurate diagnosis. There are, of course, some conditions which give a symptom picture which is almost distinctive, but this should always be verified. It is especially common to describe certain combinations of symptoms referred to the digestive tract as characteristic of this or that disease, but therein lies considerable danger and doubtless we have all seen instances of the possibilities of error in this. The reason probably is that many of the symptoms are really due to disturbance of the sympathetic system which may be inaugurated from many different areas. Take gastric hyper-acidity, for example, which was thought years ago to be characterized by a fairly definite symptom picture. We have learned the error of this and in addition, largely through the labors of certain of my colleagues, that many of our ideas as to supposed hyper-acidity figures and their relation to abnormal conditions were absolutely wrong.

Let us discuss some of the particular problems connected with symptoms, but first may I digress for a moment to discuss one of my hobbies—the proper use of words? We should be careful not to accept terms given by a patient which have a variety of meanings, such as "rheumatism," "neuritis," "bilious," etc. An exact statement should be obtained of what is meant. What the patient means by "rheumatism" and what you understand him to mean may be far apart. The lay idea of anatomy is often very hazy and the statement from a patient that he has pain "around the heart," for example, should never be accepted. He should be made to show

where the pain actually is situated. Our use of the word *functional* should also be definite, as it is employed in very different ways. We speak of a functional nervous condition and of a functional disturbance of the heart. In the former case we clearly exclude organic disease, while in the second case a functional disturbance may be associated with and due to organic changes. It is certainly difficult to do away with this confusion, but we should be clear in our minds as to the significance we give the word. In one sense we may say that disturbance of function is what brings the patient to us and our diagnosis is a search for its cause.

Of the handicaps to proper ideas of disease which we give ourselves by using careless and unjustified terms there are many examples. Those old frauds "too much uric acid" and "acid in the blood" have gone out of use very largely, but there are others which sometimes even yet appear to have some standing. "Intestinal auto-intoxication" has to a large extent lost its vogue, but it is still heard too frequently. A careful study of symptoms and the causes that produce them should soon lead to the disappearance of this incorrect and misleading term, the symptoms attributed to the supposed condition being due to various causes, such as infection, disturbances of motility, an irritable colon, and derangement of the sympathetic nervous system.

Study of the Sympathetic System. Let me emphasize the need of a thorough knowledge of this if one is to explain many symptoms, especially those connected with the gastro-intestinal tract. Many of what we ordinarily designate as symptoms of disease of some organ are due to an associated sympathetic system disturbance. Witness many of the symptoms resulting from disturbed function of the thyroid gland. In the gastro-intestinal tract the influence of the visceral nervous system is always in evidence and many symptoms are obscure unless this is kept in mind and understood. In this the parasympathetic portion (the extended vagus) plays the largest part. For example, many of the symptoms which we associate with gastric ulcer are really due to vagus disturbance. Many years ago I remember a wise old physician saying to me: "My standby in digestive disturbance is bromide and belladonna. It is always safe to make a trial of them anyway." The reason for this practice is evident when we remember the sympathetic system.

Take some of the common symptoms of derangement of the digestive tract. How many individuals begin the day by a careful inspection of the tongue with an epicure-like study of the taste in the mouth and are elated or depressed by the results. In many cases a coated tongue is due to reversed peristalsis and particles from the colon may readily reach the tongue, explaining sometimes the unpleasant taste so graphically described by Mulvaney in "Soldiers Three." In this same way nausea is probably more often due to disturbance in the colon than in the stomach. Reversed peristalsis is responsible for many of these derangements. Vomiting, regurgitation, belching, a foul breath are frequently due to it. If we are to get at the essential cause of these disturbances we must be willing to expend more than a perfunctory study in their investigation.

Pain. Naturally this stands out as the chief among symptoms, but it is conducive to clinical humility to realize how very little we really know about it. Study the next ten patients who come to see you complaining of pain and find out in how many you can give a *complete* explanation of its causation. A "catchword" explanation will not do, but that is what we are satisfied with in the majority of cases. Try to explain the exact cause and mechanism of the next half dozen cases of headache and see what success you have. I doubt if there is anything more helpful in our education than a thorough study of the explanation of pain, and we cannot fail as years go by to increase our ability to determine the cause if we study it at all. Obviously only a few of its many aspects can be discussed here and these briefly. Our discussion at present need be only with the more obscure causes of pain.

In the study of the cause of pain there are many methods employed. One deserves more attention than is usually given to it—the putting down of all the possible anatomical sources and the various headings under each one. Take the common complaint of pain in the back, often so obscure. If we make a list of all the possibilities it is a long one, but the main headings are few and can usually be excluded or proved, and with each of these goes several sub-heads, so that finally there are few left to consider. In this connection reference may be made to one condition which, curiously enough, has received very little attention on this continent, namely, fibrositis. Many of the apparently obscure pains, often designated "neuritis," "muscular rheumatism," etc., are due to this. It is extremely common,

is responsible for much minor disability and is usually due to infection somewhere. If more attention was paid to its recognition certain of the cults would fall on harder days.

Referred Pain. We have to recognize that the situation of pain and the seat of the diseased process causing it may be far apart. This sounds elementary and it is, but that it requires reiteration is proved by the number of patients with tabes and spondylitis who have the abdomen opened on account of referred pain. This is one of the most interesting fields of work in medicine and it is difficult to think of a more satisfactory exercise, intellectual and diagnostic, than to work out the cause of an obscure referred pain. Let us take the prostate gland as an example. Disease of this organ may give many symptoms, but the referred pains are most interesting. In one patient renal colic is accurately simulated, in another the symptom of sciatica, in another pain is felt in the lower back. A study of the anatomy and a knowledge of physiology go far to solve the problem, but they do explain why in one patient the referred pain goes along one path and in another chooses another route.

No problem is more complex than that involved in studying the explanation of pain referred to the region of the heart. Here again let me emphasize the need of accurate description as to the exact seat of the pain or discomfort. This is particularly important in deciding whether the aorta or heart is concerned. Pain or discomfort referred to the precordium is a common symptom; we all know the difficulty in interpreting its cause and significance. To discuss the problem fully at this time is not possible and reference can be made only to a few points. Emphasis should be placed on the value of the study of the *viscero-sensory reflexes*. We have here a most useful means of investigation which for some reason does not receive the attention which it should. It has never "caught on," so to say, and I put in a plea for its more extended use. It requires some knowledge of anatomy and physiology, but this can be acquired in a short time and the dividends are large. I need not remind you how often Sir James MacKenzie has emphasized this point and laid stress on the value of the work that may be done by the general practitioner in a study of a patient over a period of years. He points out that the way is not easy and every one who has tried to travel it will agree. For example a patient comes complaining of disturbed sensations in the region of the heart. No signs of organic disease of the heart are found, the organ is doing its work properly but there is sensory disturbance, and a study of sensation shows areas of hyperæsthesia. With improvement in the general condition the discomfort disappears and the patient a year later is found to have lost the sensory disturbances. Another similar patient may make as good a symptomatic recovery, but examination shows the objective sensory features unchanged. In a patient recently seen this was the case after an interval of three years. How are we to regard these patients? Both are subjectively free of their symptoms, one is free of the objective findings, the other has them, not subjectively but only objectively. Here is one of the problems which further study is required to settle.

This question of pain in the left thorax particularly has much to do with the interpretation of what is angina pectoris. A patient comes with suspicious symptoms, and for his sake and our reputation an exact diagnosis is most important. We all know how difficult this may be and how much depends on a correct conclusion. Here a careful study of the symptoms and their interpretation does much to make a dark problem clear, particularly in separating aortic and cardiac sources. Not that the problem is always soluble, for if you study the discussion of pain in angina pectoris in Sir Clifford Allbutt's work it is evident that the question is not by any means an easy one to decide. My own feeling is that his explanation of the pain of angina pectoris as originating in disease of the first part of the aorta has much in its favor.

Then there is the pain referred to the region of the heart in the neurotics and those who have neuro-circulatory asthenia. We may say a hypersensitive nervous system—which is perhaps satisfying but really not conclusive. There are some remarkable problems in this field, and the explanation of the pain may be beyond us. Take, for example, the occurrence of attacks in males which mimic angina pectoris, and are apparently associated with disease of the prostate or deep urethra, disappearing after correction of the local disease. The group of patients who suffer from some disturbance in the sexual sphere and have associated cardiac pain is a large one. The explanation of the mechanism is difficult.

The complaint of *abnormal sensations* is a common one and it is easy to dismiss them as "functional'" but this is not a diagnosis. Natur-

ally these are especially important is diseases of the nervous system. They are sometimes of the greatest value, as, for example, in the early diagnosis of pernicious anemia. It does not do to dismiss them lightly; they have some meaning and it is our duty to find it. Take the curious muscular cramps, often nocturnal, usually in the muscles of the legs, which so torment some patients. How do we explain the common numbness and tingling of the hands so often complained of about the time of the menopause? We sometimes find an explanation for these and many others, but more often we are unaware of the mechanism. There is no lack of problems to be solved.

This address has dealt with simple things which are the most important ones in medicine, as in life generally. Those of us who have been on committees and such bodies, the number of which is a perfect plague in the lives of many of us, know how often one member seems to be able to get down to the fundamentals of some difficult question, so that when he has had his say, the matter seems clear. In medicine, many of the problems have to be settled by a committee of one—yourself. The more you can get to the simple underlying facts the easier to solve the problem. Let us endeavour to do this in our daily work, realizing that most of our problems have to be settled by our own senses and our own brains. I am not disparaging the help from other sources, often essential, but let us be sure that it is essential before we call for it. Let us try to train and develop our own powers by using them.

The material which we first receive to use in the making of a diagnosis is in the form of symptoms. Without them we are greatly handicapped. Let us train ourselves to obtain them thoroughly and then use them wisely. A good diagnostic sermon might be preached on this as a text—"Which symptoms are important." We are often confused by the multitude of complaints, and I have sometimes wondered if the diagnostic skill of some men was not greatly due to their ability to choose what was essential. It is in the power of all of us to increase our ability in this direction if we are careful to study symptoms thoroughly. It is not spectacular, it requires time and patience, but it is well worth the effort.

Then emphasis may be placed on the delight of the process as an intellectual problem. To have joy and interest in one's daily work makes for happiness, and what profession can equal ours in the possibilities of this. To solve an intricate chess problem or a clever detective story is a pleasure, but we have just as interesting problems every day. Even as an intellectual pursuit it is worth while, not to mention the satisfaction of thorough work and the benefit to the patient.

That many of the problems related to symptoms are still unsolved should be a stimulus to us to do our part to make them clear. We need not expect to do this in a day, but if everything was cut and dried where would much of the satisfaction of practicing medicine be? There are few greater satisfactions than to solve a difficult problem. In this the thorough study of symptoms takes no mean place in the equipment of our work. All the problems will not be solved in our day, but we can take satisfaction in the thought—

> For at our heels a fresh perfection treads
> Born of us; fated to excel us.

Treatment of Enuresis.—De Haan presents convincing arguments that the main cause of enuresis is the exceptionally profound sleep. The slumber is so deep that it is below the threshold for the normal rousing reflex for evacuation of the bladder. There is some neuropathic factor involved in this unusually deep sleep, but his experience as psychiatrist to two large children's asylums has amply demonstrated, he asserts, that all that is necessary to cure it is to prevent this extremely deep sleep at night. In mild cases, a nap during the day may be enough. Or the child may be put to bed a few hours earlier than usual but without darkening the room till the usual time. In the severer cases, the child is kept in bed all day long, in an atmosphere of calm and quiet. The repose is often distinctly beneficial in other respects. Excluding actual imbeciles and idiots, a cure may be counted on in 99 per cent. of the cases. Relapses are treated in the same way, merely by measures to make the night sleep normal; the factors responsible for the unusual depth of the slumber should be sought out and avoided in future.

THE REGULATORY FUNCTION OF THE KIDNEY IN NEPHRITIS

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AMONG the duties performed by the normal kidney are the excretion of water, whereby the osmotic pressure of the blood is maintained, and the regulation of the reaction of the blood. Although the kidney in nephritis has been made the subject of much research, little prominence has been given to disturbances of this regulatory function.

It is true that the ability of the kidney to excrete water, under various conditions, has been studied by many but alterations in the reaction of the urine in pathological states of the kidney, has been shown comparatively meagre consideration.

Henderson and Palmer (1) observed that the reaction of the urine from nephritic patients was more acid than that from other subjects. Leathes (2) investigated the reaction of the urine in the nephritis of soldiers. He devised a method by which the diuretic power of the kidney may be ascertained and the reaction of the urine determined. Opportunity has been recently afforded of applying this test to a series of nephritis cases in the wards of the Royal Infirmary, Sheffield.

The test, which is a form of water test, is carried out in the morning. The patient is kept in bed and is allowed no food or drink after the evening meal the night before, until noon, with the exception of 500 c.c. of water which he is given to drink at 8 o'clock in the morning. The urine is collected in six fractions. All the urine passed between 10 P.M. and 7 A.M. is collected into one bottle. At 7 A.M. the bladder is emptied and this urine is received into the same bottle. The bladder is emptied again at 8 o'clock into a second bottle and immediately afterwards, the patient is given 500 c.c. of water to drink. He is asked to pass all the urine he can at hourly intervals until noon, that is at 9, 10, 11, and 12 o'clock, each specimen being received into a separate labelled bottle.

For the collection of the urine, it is advisable to use six large-mouthed bottles of about one liter capacity. To each are previously added 2 or 3 c.c. of toluol as a preservative. The danger of urinary decomposition is further prevented by having the patient pass his urine directly into the bottles; otherwise care must be taken that the vessel used for collecting it is dry and perfectly free from all traces of stale urine.

Each specimen is measured separately in a clean dry cylinder. Normally, the urine excreted during the night is scanty in amount, 30 to 40 c.c. per hour, and 500 c.c. of water produces a marked diuresis; the volume of the urine passed the first or second hour after the water being four to six times that passed the hour previously (Fig. 1). In nephritis, the volume of urine excreted per hour during the night is often increased above normal and the diuretic response diminished or absent (Figs. 2 and 3).

The method for determining the reaction depends upon the fact that the principal constituents in the urine which determines its reaction are the mono- and dibasic phosphates. The monobasic sodium phosphate or acid sodium phosphate (NaH_2PO_4) is acid in reaction, while the dibasic sodium phosphate (Na_2HPO_4) is alkaline in reaction (3). The urine reacts like a solution containing a mixture of these two types of phosphates. If in a solution, all the phosphate be acid phosphate, methyl orange will turn

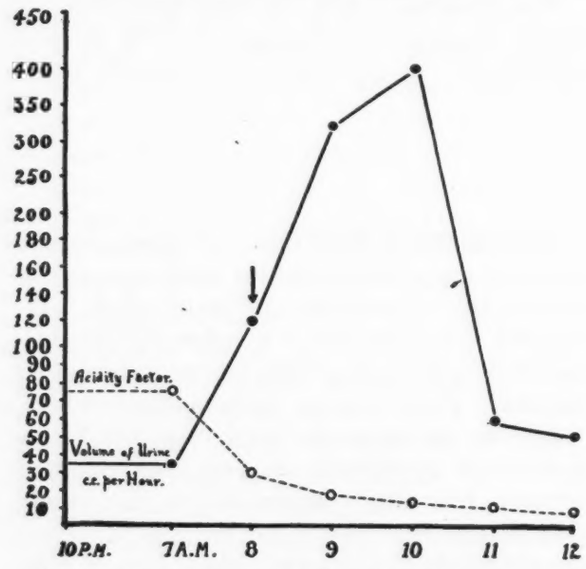

FIG. 1.—Normal curves showing diuretic response and alkaline tide in a normal subject. 500 c.c. of water given to drink at 8 o'clock.

pink. If there be any dibasic phosphate present, its color will be yellow. If,on the other hand, all the phosphate be basic, phenolphthalein will be pink; if there be also acid phosphate present, this indicator will be colorless.

The reaction of the urine usually lies between the turning points of these two indicators. So by titrating with decinormal acid and methyl orange and with decinormal alkali and phenolphthalein, the relative amounts of dibasic and acid phosphates can be determined, according to the results of the titrations. The ratio depends upon the reaction, therefore the reaction can be expressed in terms of the percentage of acid or basic phosphate. The percentage of acid phosphate may be referred to as the "acidity factor".

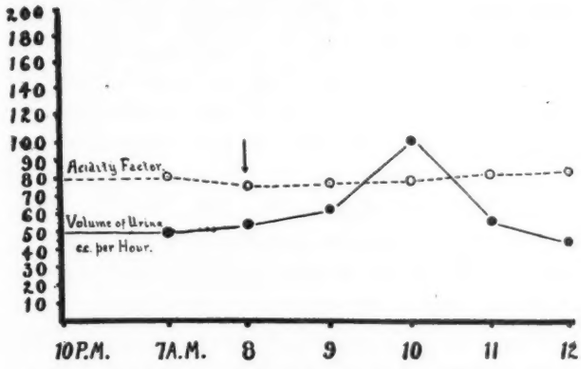

FIG. 2.—Nephritic curves showing high acidity factor, slight diuresis and no alkaline tide. 500 c.c. of water given at 8 o'clock.

Two 10 c.c. portions are pipetted from each specimen of urine into titrating flasks. To each flask are added 20 c.c. of distilled water, 4 or 5 drops of methyl orange indicator and 2 or 3 drops of phenolphthalein indicator. The contents of one flask of each pair is titrated with decinormal H_2SO_4 until the pink tint of methyl orange is obtained. The same flask is now titrated with decinormal NaOH until the pink color of phenolphthalein appears. This is repeated with the remaining five samples of urine. The second flask of each pair may be used as a control.

The amount of acid required represents the equivalent of the dibasic phosphates; the amount of alkali the total phosphates; while the difference gives the equivalent of the acid phosphates. The percentage of the acid phosphates can now be determined. This is the "acidity factor".

The normal subject, as well as the nephritic, produces during the night a urine which is acid. In the morning, the reaction, in the case of the normal person, swings strongly to the alkaline side (Fig. 1). This, as pointed out by Leathes, is the morning "alkaline tide". Most nephritic patients fail to show this normal alkaline tide but exhibit a continuously high acidity. The acidity factor was observed to be higher in the azotæmic type of nephritis (Fig. 2) than in the hydræmic type (Fig. 3) of Maclean (4).

That the cause of the normal variation in the reaction of the urine is not due primarily to the diuresis may be demonstrated in a person with normal kidney function by reducing the amount of water taken to 250 c.c. or even 100 c.c. There is, under these conditions, a corresponding diminution in the diuretic response but with a normal alkaline tide.

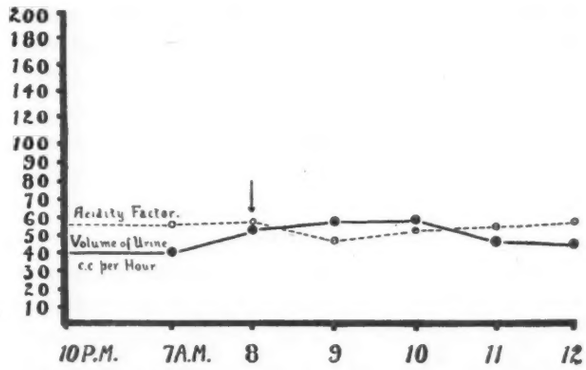

FIG. 3.—Nephritic curves showing absence of diuresis and a very slight alkaline tide. 500 c.c. of water given at 8 o'clock.

Summary: (1) The regulatory function of the kidney is interfered with in nephritis as shown by the limited power of water excretion and the absence of the normal morning alkaline tide. (2) The nephritic kidney is apparently not unable to excrete an acid urine. The deficiency rests in the fact that it produces a urine with a high acidity factor at a time when a normal kidney produces a urine with a low acidity factor. (3) The water test, as described by Professor Leathes, may be used as a means for detecting impairment of renal function.

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TWO CASES OF A POLYNEURITIC AFFECTION RESEMBLING ACRODYNIA MET WITH IN YOUNG CHILDREN

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ACRODYNIA is the name which has been given to an obscure affection met with in old or poorly nourished adults, most frequently in epidemics occurring at comparatively long intervals in various portions of middle and southern Europe. The symptoms are those of a polyneuritis, and resemble to some extent those of arsenical poisoning. Beginning with gastro-intestinal disturbance and impairment of general nutrition, burning pains in the palms of the hands and the soles of the feet with hyperæsthesia, become a marked and distressing symptom. These pains are associated with an erythematous rash most marked in the extremities; in some cases going on to an intense pigmentation; in others accompanied by the development of small vesicles or even bullæ. Photophobia and profuse lacrymation is a frequent accompaniment; the affection is afebrile excepting a short period at the very onset; it also appears to be self-limited, but severe cases may end fatally. Until recently the disease has not been regarded as an affection of early childhood.

The first epidemic in which this affection was studied and described occurred in Paris in 1828 and lasted till the winter of 1829-30. Since this epidemic cases resembling those met with in it have been reported in small groups at long intervals in Europe, Mexico and in both the East and West Indies.

In 1888, Henry Strachn, Senior Medical Officer of Kingston Hospital, Jamaica, reported 510 cases of what he termed "malarial multiple neuritis" in which the symptoms described resembled those met with in the Paris epidemic. In addition to the symptoms which have been enumerated, Strachn noted in many of his cases impaired vision and hearing, and a feeling of constriction along the lower part of the chest; also an eczematous condition on the tops of the eyelids, angles of the mouth and mucocutaneous margins of the nostrils. Pain was constant especially in the feet, emaciation developed with the course of the disease, but death was rare; the disease appeared to be self-limited, and recovery was the rule.

Since that date we hear very little of this affection until Dr. Weston, in a paper read before the American Medical Association in the Section of Diseases of Children (*Archives of Pediatrics* 1920, Vol. xxxvii, p. 573), reported eight cases in the practice of Dr. W. F. Patrick, of Portland, Oregon. The notes of these cases had been forwarded to Dr. J. Lovett Morse, of Boston, for diagnosis, but he declined to make one, and forwarded the reports to Dr. Weston, considering them suggestive of pellagra. Dr. Weston, while regarding them as like pellagra in some respects, thought they more closely resembled the obscure affection known as acrodynia, and as such reported them in his paper, at the same time giving us an account of what was known of that disease. In November of the same year, Dr. Albert Byfield, in a paper entitled "A poly-neuritic syndrome resembling pellagra (acrodynia?) seen in very young children", (*American Journal of Diseases of Children*, Vol. xx, p. 347), reports having met with seventeen cases in children all under 4 years of age, five of them less than a year old, with symptoms suggestive of pellagra, but differing from that disease in so many respects that it must be regarded as quite a separate affection.

Two cases similar in character to those described have been met with in the outdoor clinic of the Children's Memorial Hospital, Montreal, and in view of the infrequence of the affection would appear to be worthy of reporting.

D. H., female child, aged 2 years, was brought to the out-patient department of the Children's Memorial Hospital, January 30th, 1919, complaining of loss of appetite and weakness, and of pains in the hands and feet which were red, cold and swollen. She had been nursed by her mother for nine months, and had been healthy and well nourished until one month ago when her appetite fell off; constipation became troublesome and she began to lose flesh. The

stools had been occasionally light in colour, but there was no indication of jaundice. Vomiting had not occurred. Perspiration was a marked feature. The hands and feet were of a bluish red hue and cold, and she complained that the toes were sore to touch. The child slept well. There was nothing in the family history of special moment. On examination the patient was described as a pale poorly nourished child weighing 20¼ lbs. miserable in appearance. Her temperature was 98 . Small nodes were palpable in neck, axilla, and groins. The hands and feet were red, swollen and remarkably cold. The body was perspiring freely and miliaria were seen over chest, abdomen and back. The mouth and throat were healthy. The teeth were good. There was no nasal discharge. The drum membranes on examination appeared to be normal. The heart and lungs were apparently quite healthy. The abdomen was flat and soft; the spleen was not felt; the liver was not enlarged. Urine was normal, but very concentrated. The specific gravity was 1,030; there was no albumen no sugar, no indican, and no acetone.

The child was brought again to the out-patient department at frequent intervals. The perspiration continued to be excessive, and the miliaria became more abundant; the hands remained always cold. On March 10th the temperature was noted as 101°F. and there were symptoms of bronchitis for which she was taken into the hospital. The child was described then as very pale and miserable; her weight was only 19¼ lbs, and there was marked photophobia. The blood count was as follows: Red blood corpuscles, 3,800,000; White cells, 9,700; Hæmoglobin, 74%. The Pirquet test was negative. The note on March 19th at the date of discharge from the hospital was as follows: Child a picture of misery; sits in bed with eyes almost closed; takes little food; loose cough with a few mucous, rales in chest; stool following cathartic brown in colour with considerable mucus. Temperature 99°F., weight, 19 lbs. 2 ounces. Symptoms otherwise little changed. On March 30th she was again seen in the out-patient department. She appeared to be a little better in every way. There was less photophobia, and the hands and feet were warmer, and of a better colour. The throat and lungs were clear and the appetite improved. A tonic containing tincture of nux vomica and bitter wine of iron were ordered. Improvement from this time set in. On April 28th she weighed 22½ lbs, and by the middle of June she appeared to be quite recovered, weighing 25¼ lbs., and the mother was directed to take her for some weeks to the Laurentian Mountains. The diagnosis in this case remained obscure. Tuberculosis, and chronic intestinal indigestion were considered and in turn were given up. It was more than one year before the articles by Weston and Byfield appeared. Acrodynia was not thought of and the importance of feeding was not recognized.

Second case. D. W., female child, aged nine months, was first seen April 29th, 1921. She was the first child born at term weighing 6¾ lbs. She was breast fed for seven months, during which time she throve well. After weaning she was fed on various mixtures of milk, water and sugar, or dextrimaltose, but failed to thrive. When first seen the infant was fretful, cared little for her food, but seldom vomited; the bowels were constipated, and the child was losing flesh. The hands and feet were always red and cold. It perspired a great deal, and had an erythematous rash over the body which appeared to be a source of irritation. The family history carefully inquired into presented nothing of importance on examination. The infant weighed 15¼ lbs. The temperature was 99°F., the general nutrition appeared to be fair; the colour on the body was good. There was marked photophobia, but no conjunctivitis. The musculature was soft. The hands and feet, but especially the latter, were purple, swollen and very cold. The body and head were perspiring freely, and miliaria had developed over back, abdomen and legs. The skin showed signs of scratching. The fontanelle was small; there was no craniotabes and no rosary or other signs of rickets. The infant had two teeth, the gums were healthy, the nose, throat and ears were all negative. The heart and lungs were normal. The abdomen was round and soft. No masses were to be felt, the spleen was not palpable. The liver was not enlarged. The infant was unable to sit alone, and made no attempt to stand. No spasticity or paresis could be made out. The urine was clear, pale, acid; no albumen; no pus; no sugar; acetone was present.

Acrodynia as described by Weston in his paper was diagnosed, and a simple diet prescribed including cereals, soup, orange juice and cod liver oil. Magnesia and liquid petrolatum were ordered for the constipation and a lotion for the miliaria. The child was seen frequently during the next few months until it was taken out of town for the summer. The symptoms showed

little improvement. Small sores developed on the toes; these began as small vesicles which broke, leaving small ulcers. The sweat-rash continued to be abundant. The photophobia persisted. By the end of May the infant had cut two more teeth; the tonsils were injected; the feet were showing signs of desquamation in fine flakes; the infant's weight was 14¼ lbs. and the temperature remained steadily about 99°F. The blood count was, R.B.C., 3,900,000; W.B.C., 11,200; Hæmoglobin, 60%. Menthol and eucalyptol nasal drops were ordered. The infant was not seen again until October 19th, 1921. The infant was then 14 months old. It had been poorly all summer, but was thought to be somewhat better during the last few weeks. It still looked miserable; photophobia still existed; the appetite was poor, and the infant was constipated. She had cut three more teeth making seven in all, but she was pale and wan. Her weight was only 11½ lbs. The hands and feet were still purple and cold, but there were no sores on them. The gums were healthy and the teeth firm. The throat appeared normal. One drop of tincture of nux vomica three times a day was ordered to be given before food and bitter wine of iron in 10 drop doses three times a day after food.

It was the middle of December before she was seen again. The notes made then read as follows: There is marked improvement. This began about six weeks ago. She is now eating well; the bowels are fairly regular and the stools good. She is active and bright, but tires easily. There is no photophobia. The hands and feet are warm. She is now 16 months old, and has 16 teeth, and weighs 19 lbs. The child continued to improve steadily from that time and is now (June 1922) active, bright and well nourished.

RENAL TUBERCULOSIS

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TUBERCULOSIS of the kidney is a condition which is essentially chronic, markedly insidious in its onset, beginning usually in one kidney, progressive in character and making itself known generally by the bladder irritation which it causes. It is generally secondary to some other focus in the body. Kuster states that 10% of tuberculosis patients have kidney involvement. In 85,000 operations at the Mayo Clinic 0.6% were for renal tuberculosis. Kapsamer in 20,000 autopsies found 191 cases of renal tuberculosis, about 1%, and his bi-lateral cases showed old processes in one kidney and early in another. Notwithstanding the fact that much has been said and written in recent years concerning tuberculosis of the kidney, many of the patients suffering from this disease are not diagnosed until the disease is far advanced. Is it not true that the general profession still adopts the procrastinating attitude towards the early recognition of renal tuberculosis, which characterized our methods in regard to pulmonary tuberculosis twenty-five years ago? Too often, I fear, we have been willing to veil our ignorance with the diagnosis of cystitis.

In the absence of definite urethral or vesical causes, every case of frequent and painful urination which persists and resists treatment of a simple nature should, until proved otherwise, be viewed as a potential tuberculosis of the kidney. Too often, however, patients with such symptoms are permitted to drift. Meanwhile, the condition in the kidney progresses until a simple cystitis is replaced by the deep seated lesions of the bladder, the bane of the operative treatment of renal tuberculosis. In a series of 112 cases of renal tuberculosis treated in our service at the Royal Victoria Hospital, the average duration of symptoms was 39.5 months; the longest was 30 years; the shortest was one month, and the findings seemed to show much older lesions. It is needless to say that for the best interests of the patients such cases should be diagnosed long before the lesions become so advanced. Early recognition of the disease not only improves the prognosis but, what is more important, it may prevent the unfortunate deep-

seated lesions of the bladder so resistant to treatment.

Why should these patients be allowed to suffer so long? There are several reasons. First, a thorough knowledge of tuberculosis of the genito-urinary tract does not exist among our general practitioners; second, the treatment by surgical means is not generally known to be the best; and third, in the majority of patients the symptoms, though significant, are slight, and are not generally heeded. A small persistent irritation of the bladder which does not yield to ordinary therapeutic measures is just as suggestive of renal tuberculosis as a slight persistent cough is of pulmonary tuberculosis. Diagnosis in the proper hands can be positively made. The process in the early stages is generally unilateral, and treatment by nephrectomy is fraught with good results. Continued nocturnal bladder irritation accompanied by pyuria should be considered tuberculosis until proved otherwise.

There are certainly numberless cases of this disease which have been, and are, treated for cystitis. The diagnosis, although often beset with difficulties, is one which can be made with a nice degree of exactness. The poor results in treatment are caused by late diagnosis or by the late institution of the proper treatment. There is no doubt that the failures of relief of symptoms are in direct proportion to the delay in proper treatment. In 80 to 90 per cent. of the cases the initial symptoms are those of cystitis. The onset is usually gradual. The bladder irritation may be due to reflex irritability of the bladder in the early stages, and later to actual lesions of the mucous membrane all the way from a slight ulceration to the extensive erosion of the bladder surface. The patient may complain of frequency with very little pain and only slight burning on urination. Frequency may vary from every two hours to every fifteen minutes during the day, and twice to fourteen or more times at night. In many cases the desire to urinate must be satisfied at once; there is distinct urgency. These local symptoms may go on almost indefinitely, or there may be periods of remission, when there is comparative comfort. If the urine is examined at this time, it will be found that there is a polyuria; the urine is pale, of low specific gravity and generally acid in reaction, with some albumin and little or much pus. About 15% of patients complain of hæmaturia, and most of them show blood microscopically.

The symptoms referable to the kidney are notably few. In about 12 per cent. of the cases there is pain or discomfort over the affected kidney. These symptoms occasionally mark the onset of the trouble. The kidney may be large on palpation. This is brought about by an actual enlargement of the kidney itself or by a hydronephrosis caused by blocking of the ureter. The symptoms are sometimes ushered in by severe abdominal pain which is followed later by the bladder irritation. The general symptoms of tuberculosis, such as chills, fever, night sweats, and loss of weight, play a very small part in the diagnosis of the condition; in fact, they are conspicuous by their absence. In many patients, if the history is enlisted carefully, it will be found that preceding the appearance of any symptoms there is a period of gradual constitutional deterioration of an indefinite character. However, in the majority of cases these symptoms are not sufficient to attract attention.

When, therefore, a patient presents himself with a persistent irritability of the bladder, what is the procedure to determine whether or not these symptoms are caused by renal tuberculosis? And if they are so caused, how are we to determine which kidney is diseased? First, the careful history. A patient having any of the symptoms described above should be interrogated with tubercular kidney in mind. How long have the symptoms continued? Is there frequency of urination? Does the patient have to arise at night to urinate, and if so, how often? Next, a careful physical examination and particularly a careful examination of the urine. If pus is present in successive specimens, a search should be made for tubercle bacilli. Demonstration of this organism practically assures the diagnosis. If the organism is not found, it does not force the conclusion that tuberculosis is not present, because it is sometimes difficult to find tubercle bacilli in the urine particularly in the early or very late stages. However, with patience and some experience it will be found that the tubercle bacilli can be found in 75 to 85 per cent. of such cases. The other method, that of guinea pig inoculation, may demonstrate the presence of the organism, and is no doubt more eloquent than the staining method, but it has the additional disadvantage of taking up a great deal of time. A complete diagnosis is only made by catheterization of the ureters.

All such patients should have the advantage of a thorough cystoscopic examination where the slightest symptoms would lead one to suspect

tuberculosis of the urinary tract. This is no formidable procedure. In the majority of cases it does not require a general anæsthetic, and it gives us more information than we can get in any other way. It is possible, by a consideration of the symptoms, examination of the ureter by vagina or rectum, and possibly by tuberculin, to locate the disease in one side or the other, but this gives no information as to the status of the other kidney, a very important factor in the prognosis and treatment. It is not always possible by the first cystoscopy to determine enough to warrant radical treatment. One thing that is characteristic of many of these patients is the extreme sensitiveness of the bladder and the consequent inability to hold much fluid. This naturally interferes with a successful examination. However, with a little patience on the part of the doctor, and rest and possibly slight local treatment for the patient, a successful cystoscopy with the aid of a local anæsthetic is possible in almost every case. In a bladder much involved it is often difficult even in competent hands to find and catheterize the ureter, as the mucous membrane is frequently so involved that the normal landmarks are entirely obliterated.

Frequently the intra-vesical picture is such that in the hands of an expert in cystoscopy, diagnosis and location of the disease are assured. The appearance of the ureteral orifices may be such as to indicate which kidney is involved. The opening of the ureter may be so surrounded with the granulation tissue that the passage of the catheter is not possible. Strictures of the affected ureter are often found of sufficient extent to prohibit the passage of the catheter, or even to prevent the infected material from the kidney from entering the bladder. This may allow the bladder partially to recover, although probably from time to time there may be enough discharge to give intermittent attacks of bladder irritability. Where the ureter is completely occluded on the diseased side, the term autonephrectomy, has been used to express in a way the effect upon the patient's general condition. If it is possible to catheterize and obtain specimens of urine from each kidney, the findings are of enough significance to warrant early radical treatment. The urine from the diseased kidney, on gross examination, is much greater in amount than that from the other kidney, often very pale, and lacking in yellow colouring of the normal side. Further examination shows it to be acid in reaction, of low specific gravity, with a trace of albumin, pus and tubercle bacilli. The urea percentage is lower as a rule than on the normal side. The phthalein output of the diseased is very much lower than that of the opposite side, which may be higher than a normal output, and it often shows a trace of albumin and casts, a true toxic nephritis which clears up promptly on removal of the diseased organ.

With a continued bladder irritability and acid pyuria with cystoscopic findings such as I have described, without demonstrating the presence of tubercle bacilli, the diagnosis is justified and radical procedure should be at once instituted.

Another important aid is the external physical examination. Nodules in the epididymis, vas or prostate are strongly suggestive; palpation of a thickened ureter per vagina or rectum is always a suspicious indication that the disease is on that side, if urinary tuberculosis has been previously proven.

Radiography may disclose the outline of the kidney, and may also show calcareous deposits. Pyelography may be used in those cases where the tubercle bacilli have not been demonstrated, and only where necessary. Keyes suggests some such trauma to bring down bacilli in urine when not previously found. Oxygen injection into perinephritic tissue has been advised.

Search for tuberculosis in other parts of the body should not be neglected. Tuberculin tests may aid, but they are not to be relied upon. The skin reactions are not of particular value because, even if positive, they do not aid in localizing the process. Subcutaneous reaction may help because besides being positive, it may occasion pain in the side of the affected kidney. I have not found it of any great assistance,

Renal tuberculosis must be differentiated from pyelonephrosis, renal calculus, renal tumours, non-tuberculous cystitis, vesical calculus, vesical tumours, etc.

The tubercle bacilli cause lesions in all parts of the kidney. The French school classifies miliary tuberculosis, nodular tuberculosis, ulcero-cavernous tuberculosis, tuberculous pyonephrosis, tuberculous hydronephrosis and tuberculous nephritis. It seems satisfactory to consider three main types, acute miliary, chronic or surgical and toxic tuberculous nephritis. It has been shown by Lawrason, Brown and others that tubercle bacilli may be excreted through healthy kidneys. Brown demonstrated that about 10 per cent. of patients suffering with pulmonary tuberculosis show tubercle bacilli in the urine

without evidences of renal involvement. With lowered resistance and active processes, the kidneys may be showered with generalized tuberculous lesions which offer no hope for restoration of function or cure. Between these two extremes is chronic tuberculosis.

In this paper I have not considered the acute miliary type, since it is a part of generalized tuberculosis and offers no hope of surgical cure. Nor have I discussed toxic tuberculous nephritis, which may be either a part of general tuberculosis or secondary to a tuberculous mate. In the latter instance, the nephritis usually subsides after the removal of the tuberculous organ. A study of a series of kidneys removed at operation in our service for tuberculosis indicates in a general way the following paths of infection:

1.—Cortex: The bacilli entering the kidney by the blood stream gain a foothold in the loops of the glomerulus or in the capillary circulation supplying the tubules. Thus there are formed small primary tubercles which spread, fuse and generally caseate, extending to the medulla. Any injury of the endothelial cells, either traumatic or toxic, combined with the mechanical conditions of the circulation favours foothold for virulent bacilli.

2.—Medulla: The earliest lesions seen in this zone appear frequently at or near the apices of the pyramids (excretory type). Tubercle bacilli which are discharged into the tubules are at this point exposed to stagnation, and possibly the action of crystalline substances, etc., in concentrated form may easily damage the epithelium. In this region we have frequently demonstrated stasis in normal kidneys. Blood and excretory infection may combine.

3.—Pelvis: Here the lesions apparently begin in the submucosa, the bacilli being brought by the blood or lymph route and gaining access due to local conditions of lowered resistance, as in the other types. Pelvic infections may, however, also become secondary to entrance of cheesy masses with bacilli from cortex to medulla. It must be remembered that these statements are very general and made only from observations on operable cases, that is on cases in which a diagnosis of unilateral involvement only was carried out and in which a good prognosis seemed justified.

The initial lesions are the typical tubercle formations. The subsequent history depends on the virulence of the bacilli and the local resistance. As a rule in the cortex multiple small foci form, which spread and coalesce.

In the medulla the pelvis usually becomes early involved and the kidney may be reinfected, giving the picture of an ascending infection. This is also the picture when the pelvis is the starting point.

Finally, all parts of the kidney, pelvis, medulla and cortex become involved, and it must be understood that a great percentage of the kidneys removed show this advanced stage in which it is no longer possible to venture even a guess at the location of the point of entrance of the bacilli.

There has been considerable discussion as to to the mode of infection of the tuberculous kidney but, at the present date, there is no exact unanimity of opinion. The original idea that tuberculosis of the kidney was caused by an ascending infection from the bladder up the ureter has long since been discarded. It is easy to see how this idea should have prevailed; the bladder symptoms are usually primary ones and therefore, it was incriminated as the original focus. Furthermore, Albarren in 1892, by injecting tubercle bacilli in the ureter, above a site of ligation, was able to produce renal tuberculosis. Wilbolt offered experiments to show that kidney tuberculosis could be produced by injection of tubercle bacilli in the unobstructed ureter but the kidney involvement which he obtained showed the lesion in the medullary substance of the kidney, which does not substantiate ureteral transmission. The work of Walker showed definitely that ascending infection up the unobstructed ureter did not occur. Halle and Moltz claimed never to have found a clinical or anatomical fact which would tend to establish the reality of an ascending tuberculous infection. Bauereisen states that with the flow of urine unobstructed, tubercle bacilli cannot reach the kidney intraureterally. Lymphatic infection has many advocates and probably is the route of infection in certain cases of tuberculosis. Bromgersma is a strong advocate of this path of transmission and has demonstrated at autopsy the extension of tuberculosis from the apex of the lung through glands along the aorta through the diaphragm to the kidney. Infection along the ureteral lymphatics, both in tuberculosis and non-tuberculous infection also has advocates. At the present time there is not sufficient proof to warrant a general acceptance of any one theory. Most authors concur in the belief that the usual path of infection to the kidney is through the

blood stream, and there is abundant evidence to warrant the conclusion that this is the most frequent manner of renal infection. With a small tuberculous involvement within the body, there are frequently temporary bacillemias. It is therefore easy to appreciate how a kidney and constant filtering organisms could, under certain conditions, become infected. There are also instances of tuberculosis in the substance of the kidney without any evidence of tuberculosis in the urinary tract. As to the exact location of the initial lesion within the kidney, there is dispute. Cabot and Crabtree in their work on renal infections seem to believe that experimentally the earlier lesion is at the base of the pyramid. There is no accepted explanation for the fact that the lesion is at the base of the pyramid. It may be due to the conditions of the tubules in this location, since they are broader and the epithelial cells are supposed to possess phagocytosis, or it may be a vascular affair since at this region the arcuate divide into the interlobular and arteriolæ rectæ. It may be possible that the change to vascular pressure in this territory may have something to do with it.

Among the many interesting features of renal tuberculosis, none is more important than the apparent cures of the disease. The disputes among the relatively few practitioners who would treat renal tuberculosis without operation, and the many who urge prompt nephrectomy as soon as the diagnosis is made, can only be settled by a clearer understanding of what the apparent cure of renal tuberculosis means. The underlying difficulty in reconciling the opposing views is probably a lack of thorough understanding of the relation between the pathological lesion in the kidney caused by the tuberculosis, and the symptoms arising therefrom. Thus, it is not generally appreciated that the variations in the patient's general health, as well as his renal and vesical symptoms are due to alteration of the pelvic or vesical lesions, rather than to changes in the kidney parenchyma itself. Every case of early renal tuberculosis submitted to operation places in our hands a possible specimen suggestive of the fact that the renal lesions are far older than the duration of the symptoms would suggest. Indeed, the mere presence of surgical tuberculosis in the parenchyma of the kidney causes no symptom. Upon this fact it is scarcely necessary to insist. The familiar case-history, with its exclusive vesical symptoms is sufficient evidence that the lesion in the kidney parenchyma does not make itself felt until one of two things happens: either it extends through the capsule and excites perinephritis, or it extends to the pelvis and there sets up tuberculous pyelitis.

Tubercular pyelitis is common. Doubtless, the painful and frequent urination, which is often the most prominent early symptom of the disease, is at the onset caused entirely by tuberculosis of the pelvis and ureter. Judging from the specimens I have seen, this tuberculosis usually takes the form of disseminated sub-epithelial infiltration of the mucous membrane, with little tubercles, which give to the mucosa a kind of pebbled appearance. At this early stage the cavity of the kidney pelvis is usually very slightly dilated (apparently by the relaxation of its walls). There may be no ulceration except that upon the papillæ, the source of pelvic infection. Yet with lesions so slight as these, the patient may be urinating every hour with considerable straining urgency and terminal pain. If the kidney is removed at this time, the frequent urination is checked as if by magic, and does not return.

The next important pathological change consists in the extension of the tuberculosis to all the layers of pelvis and ureter, and to the bladder. Upon the mucous surface the tubercules ulcerate, and upon the outside they excite that adhesive inflammation about the pelvis and ureter with irregular thickening of the walls of those channels, which is so characteristic of renal tuberculosis. As a result of this ulceration and infiltration, the lumen of the excretory channel becomes more or less completely obstructed and the region above the obstruction dilates. Inasmuch as the cavity of the kidney pelvis itself often becomes almost completely obstructed by this process, the dilatation may affect only one portion of the kidney, though it usually affects the whole organ. Occasionally the obstruction is in the ureter, and the pelvis itself is widely dilated instead of being contracted. As a result of these pathological changes renal colic may occur from the passage of blood clots, or shreds of fibrin or tissue, or pain in the loin may result from distention of the kidney or a perinephritis; while a more or less definite sensitiveness and dragging pain in the side may result, either from the extension in the kidney and its pelvis or from the dragging of the shortened and thickened ureter, or from perinephritis. But if the ureter is not shortened, and if the retention either in one pole of the kidney or the whole kidney is sudden and complete instead of being gradual and

incomplete, the patient's discomfort may suddenly cease either with or without renal colic. Even though the tuberculosis has extended down the ureter beyond the point of stoppage, if urine ceases to flow through the ureter the symptoms will promptly cease whether the flow of urine is checked by nephrectomy or by plugging of the duct-autonephrectomy.

In the light of these facts the varying histories of patients with renal tuberculosis are readily understood. The great majority of them have frequent and painful urination, and though from time to time very considerable remission of the symptoms may recur, they never entirely disappear; and as the inflammation progresses, invading more and more of the bladder, the general tendency is for the urinary distress to become more and more marked. Some patients fail rapidly in general health on account of partial retention, usually in the kidney pelvis, less often in the bladder. But the exceptional patient may continue to have fairly good drainage and exhibit a most extraordinary good health. On the other hand, once in a long while one encounters a case of renal tuberculosis whose symptoms have suddenly and completely ceased, and who has apparently regained perfect health without operation.

I have operated on several patients with intermittent or relative comfort from one to six months. The operative findings showed kidneys with walled off old tubercular cavities, cheesy, or calcifying and fresh lesions in the vicinity or opposite pole.

Caulk claims that there has never been in the history of medical literature a single authentic case of spontaneous healing of a tuberculous kidney. The ultimate outcome is always one of complete destruction of the kidney and usually severe mutilation of the rest of the urinary tract.

The treatment of renal tuberculosis when unilateral is nephrectomy, care being taken to remove all perinephritic infiltration of tuberculous tissue, and to avoid the discharge of any of the secretion from the severed ureter or pelvis. I am in the habit of suturing the wound without drainage.

Following recovery from the operation we must not forget to place the patient in the best hygienic surroundings possible. In fact a prolonged treatment as for pulmonary tuberculosis should surely be instituted and carried out.

THE REACTION OF THE BLOOD IN REFERENCE TO THE REGULATION OF RESPIRATION AND THE INFLUENCE OF ANAESTHESIA THEREON*

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IN this paper it has been my endeavor to present for your consideration some of the latest work that has been done on the subject of chemical factors in the blood in relation to the activity of the respiratory centre. While recognising the existence and the importance of nervous impulses received by the centre, chiefly by the afferent vagus fibres distributed to the lungs, we shall disregard for the present this factor in the regulation of respiration.

It may be considered as definitely proved that in normal respiration lack of oxygen plays no part. The belief that carbon dioxide is the substance which normally excites respiration was confirmed and extended by Haldane and Priestly, who showed that respiration is so regulated as to keep the alveolar and blood tension of carbon dioxide practically constant for the same individual.

It is generally accepted at the present time that the H-ion concentration of the blood is alone concerned in the chemical regulation of respiration. A short time ago Scott (1) published the results of a number of experiments on the effect of the accumulation of carbon dioxide on the tidal

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air and on the H-ion concentration of the arterial blood. These experiments were performed in an attempt to produce a definite change in the H-ion concentration of the arterial blood due solely to carbon dioxide, and to study the coincident response of the respiratory centre and the total carbonate content of the arterial blood in an animal breathing gradually increasing percentages of carbon dioxide. With a gradually increasing percentage of carbon dioxide in the inspired air, a point is reached where, in spite of the accelerated respiration, sufficient carbonic acid accumulates in the blood to produce a detectable elevation in the H-ion concentration. Accompanying this increase in carbonic acid there is a very considerable elevation of the bicarbonate content above normal. During the preliminary period while the animal is respiring atmospheric air, the molecular ratio,

$$\frac{H_2CO_3}{N_aHCO_3}$$

of the arterial blood is 1.4: 28.9, or $\frac{1}{20.6}$ At the end of the rebreathing period, when the carbon dioxide in the inspired air has risen to 6.45%, the ratio is 3.8: 49.6, or $\frac{1}{13}$.

In the experiments of Scott decerebrate cats were used as the experience of other workers in this field has been that they were unable to find any anæsthetic which did not depress the respiratory centre if given in sufficient dosage to prevent struggling. Urethanized cats show an apparently normal respiration when breathing atmospheric air, but when made to breathe increasing quantities of carbon dioxide the response of the respiratory centre is quite different from that of a decerebrate cat under the same conditions. The decerebrate preparation responds by a progressive increase in rate and depth. The animal under urethane shows increased depth only. For an atmosphere containing 5% carbon dioxide pulmonary ventilation increased twice as much in the former as in the latter.

From these observations it is evident that anæsthetics so depress the respiratory centre that it will tolerate a much higher percentage of carbon dioxide than will the normal centre. Hence the sensitivity of the respiratory centre is a very important factor in maintaining at its normal level the molecular ratio carbonic acid: sodium bicarbonate.

If we accept the hypothesis that the H-ion concentration of the blood is alone concerned in the chemical regulation of breathing it follows that the first appreciable increase in the tidal air in the above experiments must have been due to an elevation in the H-ion concentration of such magnitude that, although it was sufficient to stimulate the respiratory centre, it could not be detected in the blood itself by any means at our disposal.

Much has been written on the subject of acidosis but there is still some disagreement over the definition of the term. No doubt much of the confusion is due to a failure to distinguish between acidosis and detectable acidosis. As defined by some authors acidosis is a condition in which the bicarbonate in the blood is reduced below its normal level. Such a definition applies to the condition in which the acids responsible for the increased H-ion concentration are other than carbon dioxide, as in diabetes; but such a definition does not consider carbon dioxide acidosis in which, as shown, there is an increase in the bicarbonate content of the arterial blood above normal.

It is possible that further light has been thrown on the problem of the chemical regulation of respiration by the experiments of Hooker, Wilson and Connett (2). Hooker and his co-workers perfused the mammalian medulla, using perfusates of which the H-ion concentration and the carbon dioxide tension were known, and studied the effects produced by these two factors upon the activity of the respiratory centre. Their experiments were directed primarily to a comparison of the respiratory response elicited by blood, the H-ion concentration of which was altered to the same degree by the addition of carbon dioxide and hydrochloric acid. The medullary centres undoubtedly lose in functional capacity in the course of perfusion and one of the most important precautions to be observed is to guard against change in the irritability of the respiratory centre. If the perfusion of carbon dioxide blood produces the greater increase of respiratory activity when tested after as well as before hydrochloric acid we may believe that the carbon dioxide blood is the more effective stimulus. These experiments appear to prove that blood with a comparatively high tension of carbon dioxide causes a greater stimulation of the respiratory centre than does blood with a lower tension of carbon dioxide but with the same H-ion concentration. The method of stimulation is unknown. As the tendency for the diffusion of carbon dioxide from the cells into the blood depends on the difference in the tension of carbon dioxide in the two systems the higher the carbon

dioxide tension of the circulating blood the slower the diffusion from the cells, and the higher the concentration in the cells when a new equilibrium is established. It would seem that the H-ion concentration of the cells and blood would likewise maintain an equilibrium. If this is true the H-ion concentration in the centre would be the same in both series of Hooker's experiments because the reaction of the two bloods was the same.

If we are to adopt an explanation for the results obtained, the most satisfactory point of view would seem to be that the H-ion concentration of the environment of the respiratory centre is its effective stimulus but that the irritability of the centre to this stimulus may vary. The normal irritability of the respiratory centre is, doubtless, the summation of a number of effects including those produced by carbonic acid, oxygen, and various ions, as well as changes in metabolic activity of whose nature we are still ignorant.

What I now wish to do is to make some application of the findings indicated to the problems connected with changes in the composition of the blood that confront us during anæsthesia. It is generally agreed that the capacity of the plasma for combining with carbon dioxide is decreased after either ether or chloroform anæsthesia. One influence of the anæsthetic is to decrease the alkali reserve. The decrease in carbon dioxide combining capacity is from 6 to 10 volumes per cent. This is an actual decrease and not an apparent decrease due to hyperpnœa, (Carter, 3). According to Reimann and Bloom (4) blood acetone bodies account for 20% to 100% of the bicarbonate fall observed, on the average for 60%. The balance may be accounted for by acetone bodies excreted, other (unidentified) organic acids resulting from incomplete oxidation, or a shift of bicarbonate from plasma to tissue cells. In this connection also it has been shown by Baldwin (5) that the acidity of the urine is increased during anæsthesia.

In an attempt to further elucidate the problem presented by these latter considerations a series of experiments was carried out in this laboratory (Department of Physiology and Biochemistry, University of Alberta) by Collip (6). The observations were made on patients who were operated on in the late morning. The bladder was emptied at 8 a.m. on the morning of operation. Just previous to anæsthetisation the urine was collected. Immediately after operation the bladder was catheterised and the urine again collected. The first urine voided by the patient was also preserved. Knowing the time and total volume of each sample, the rate of secretion was calculated. The relative acidity and the concentration of phosphates were determined by double titration according to the method of Leathes (7). This method depends upon the following considerations: In a solution of sodium phosphate, if all the phosphate is acid phosphate methyl orange turns pink; if any of it is dibasic this indicator is yellow; when it is all dibasic, and not before, phenolphthalein turns pink. In a solution of mixed phosphates by titrating with methyl orange and N/10 acid, the amount of dibasic phosphate is determined, and by titrating with phenolphthalein and N/10 soda the amount of acid phosphate present is determined. The ratio of the amounts used gives the ratio in which the two phosphates are present. This ratio varies with the reaction, and the reaction of the mixture may be given as so much per cent. acid or alkali. The reaction of the urine practically always lies between the turning points of methyl orange and phenolphthalein. Since the principal constituents of the urine that determine its reaction are the phosphates, the reaction of the urine may be expressed in the same way. Ammonia was also estimated and the rate of secretion of urine.

The acidity of the urine was increased in fourteen out of fifteen cases; the rate of secretion of ammonia was slightly increased in nine cases; phosphate elimination was decreased in ten cases.

The average results before, during, and after operation are as follows:

	Before	During	After
Secretion of urine cc. per hour	43.6	32.6	27.0
Acidity of urine	47.0	67.0	72.1
Phosphate excretion	24.5	22.4	26.6
Phosphate concentration	63.7	67.6	104.2
Ammonia excretion mgm. per hour	24.5	22.1	21.4
Ammonia concentration mgm. per 100cc	65.4	72.8	85.3

Phosphate concentration is expressed in cc. of N/10 acid required for 100 cc. of urine in going from the phenolphthalein to the methyl orange point.

It is suggested by Collip that the increased ventilation of the lungs and the production of acid bodies during anæsthesia neutralise each other. He believes that the results of the experiments here outlined do not indicate any great alteration in the reaction of the blood. In anæsthesia there is not usually a detectable increase in H-ion concentration, that is, acidosis in the sense of being detectable is not present. The respiratory centre is depressed by the anæsthetic and will tolerate a higher percentage of

carbon dioxide than will the normal centre but its response is such under ordinary conditions of anæsthesia as to keep the reaction of the blood nearly constant.

The point that is brought out by the foregoing discussion is, that the use of carbon dioxide by inhalation during anæsthesia is illogical. Carbon dioxide is probably the most effective stimulus to the respiratory centre and during anæsthesia, as a result of the action of the anæsthetic, the sensitivity of the centre is decreased so that it will tolerate a higher tension of carbon dioxide, and thus it might appear sound to administer carbon dioxide for the purpose of stimulating the centre, but from the experiments last quoted we learn that the response of the regulating mechanism is sufficient to maintain the reaction of the blood within physiological limits. Therefore, the administration of carbon dioxide does not appear necessary and it would seem unwise to run the risk of overbalancing this mechanism with the possibility of causing a fatal acidosis. (See Haggard and Henderson (8) for the report of an experiment in which a dog given hydrochloric acid intravenously in quantity supposed to be insufficient to cause death, dies following the administration of carbon dioxide).

On the other hand the administration of sodium bicarbonate to maintain the power of the organism to combine with acids produced during anæsthesia appears a rational procedure. Its use, however, is to be restricted to those cases in which there is positive indication for its employment. Here I am in accord with Reimann and Bloom (4) when they state that the preliminary administration of bicarbonate is to be resorted to only when the carbon dioxide capacity of the plasma is less than 58 cc. per 100 cc.

The conclusion I would draw is that in the normal individual under ordinary conditions the organism is capable of caring for the excess of acid bodies produced during anæsthesia and that intervention is not called for.

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Treatment of Heart Failure.—In the treatment of failure of compensation, Starling says, rest is most important. It not only diminishes the demands on the heart from the arterial side, but by removing the main cause for the return of the blood to the heart it enormously decreases the inflow into this organ; and it is inflow which in the healthy heart determines output. The value of oxygen, when there is any cyanosis, is explained by its action in diminishing the blood pressure necessary to drive a sufficient amount of blood through the brain, the relaxation of arterioles and the improved supply to the vital organs of the body, and the direct effect of a proper supply of oxygen in improving the contraction and aiding the reintegration and recovery from fatigue of the heart muscle. The plethora attending failure of compensation is a reaction on the part of the organism, as a whole, not on the part of the heart, and does not assist this latter organ. It may, in fact, be harmful when the heart is beginning to recover under the influence of the other modes of treatment just mentioned. One can, therefore, understand the beneficial effects of bleeding as a preliminary measure in certain cases of failure of compensation, as well as the value of diminished salt intake. Another factor of importance in enabling the heart muscle to recover its physiologic condition is the circulation through the coronary vessels. Starling is inclined to ascribe the beneficial effects of graduated exercises in heart disease very largely to the improvement of the coronary circulation brought about by the temporary rise of arterial pressure accompanying the exercises. So important is the coronary circulation for the functional capacity of the heart that every medical man should be aware of the manner in which this circulation is regulated. The oxygen usage of the heart is directly proportioned to the work it does, and its oxygen supply must therefore vary within the same limits as its work, *i. e.*, in a healthy heart from 1 to 7 or 10.—*London Lancet*, December 10th, 1921.

END RESULTS OF SURGICAL TREATMENT OF DISEASES OF THE STOMACH AND DUODENUM*

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THIS paper is based on a series of 107 cases of diseases of the stomach and duodenum occurring in private practice, in which I have operatively demonstrated the pathology. Although the series is a small one, yet it seems to me that certain ideas of value may be drawn from it. The cases may be labelled as follows:

Ulcer of the stomach	16
Cancer of the stomach	26
Syphilis of the stomach	1
Pyloro-spasm	4
Gastric ptosis	1
Gunshot wound	1
Duodenal ulcer	55
Duodenal kink	1
Perforated duodenal ulcer	1
Undoing of gastro-enterostomy	1

The etiology of these lesions will not be discussed because that question does not come within the scope of this paper.

Gastric ulcer: Of the stomach cases, 14% were represented by benign ulcer. The age of the patients varied from 24 to 73 years, and the duration of symptoms before the case came to operation from 3 months to 30 years. In 11 cases a gastrectomy was performed with 1 fatality, a mortality of 6%. The amount of stomach removed varied with the size of the ulcer: in some cases half of the stomach was removed; in others four-fifths. After 2 to 8 years, 7 of these, or 63%, were cured, 2 were improved, and 1 case was unimproved. In 5 cases a gastro-enterostomy was done with no mortality. Of these cases, 3, or 60%, reported themselves cured 6 to 11 years after operation. The other 2 could not be traced.

The treatment of gastric ulcer depends upon the location of the ulcer and the amount of stomach wall involved. If the ulcer is located at the pylorus, a simple pylorectomy is indicated with an end-to-side anastomosis to the jejunum after the method of Balfour. If the ulcer is located in the pyloric portion on the lesser curvature, a more extensive partial gastrectomy should be done. If the open end of the stomach is over 4 cm. in length, a portion of it should be closed in the usual way before making the end-to-side gastro-jejunostomy. In cases of high lying ulcer, it has been my practice to do a more extensive partial gastrectomy with the closure of the proximal end of the stomach, and posterior gastro-enterostomy is then added. Every gastric ulcer should be regarded as malignant until it has been proved otherwise by the pathologist. Therefore, extensive removal of the glands, particularly those along the lesser curvature, should be a routine procedure. The 5 patients upon whom only a gastro-enterostomy was done were poor operative risks, but their condition was so much improved by the simple operation that, without exception, they declined to submit to a later gastrectomy.

A study of the readings of the patient's blood pressure, taken frequently during operative procedure on the stomach, has brought out the point that the greatest and most rapid fall in the pressure, and consequently the greatest shock, occurs when the lesser curvature is being handled and when the gastro-hepatic omentum is put under tension. For this reason, in doing a gastrectomy, it has been my custom first to free the greater curvature, next to cut across the duodenum distal to the pylorus, closing the distal end, and then do the necessary work on the gastro-hepatic omentum. This order in making the various steps in the operation places the time of possibly greatest shock at such a stage of the operation that the latter can be finished speedily, if necessary.

Gastric cancer: In this group there are 26 cases, or 24.3% of the total number, the age varying from 38 to 73 years. In 9 cases, gastrectomy was done with 4 deaths within one week; in 4 cases, gastro-enterostomy, with no immediate deaths; in 3 cases, in which the cancer was situated at the cardia involving the lower end of the esophagus, gastrostomy was done. The operative mortality in this group was 15.3%.

*Read before the General Section, Canadian Medical Association, Halifax, N.S., July 7th, 1921.

Out of this group of 26 cases, 2 are now living; one patient has lived 2½ years and feels she is cured; the other was operated upon about one year ago for ulcer, but it proved to be lympho-sarcoma.

Length of life following operation: 1, 6 years; 1, 4 years; 1, 3 years; 2, 2½ years; 1, 2 years; 18, less than 1 year.

As far as treatment is concerned, these cases may be divided into three groups: First, if the cancer is confined to the pylorus or the pyloric portion, gastrectomy should be done, with as wide a removal of the glands as is possible; second, if the growth is an obstructive one, even if wide-spread metastases be present, gastro-enterostomy should be done; third, in cases with extensive metastases, without obstruction, no operative procedure on the stomach is indicated.

The cautery should be applied to all cut surfaces in the operation for gastric cancer, and it is wise to keep the anastomotic opening as far away from the growth as possible.

FIG. 1.—Pylorus crushed and ligated with fascia removed from the rectus sheath. This picture taken three months after operation.

Duodenal ulcer: There are many things to be considered in making the diagnosis of duodenal ulcer. The typical history is not always seen, and the X-ray has become a very important factor in diagnostic work in this field. Skill is required not only in taking the plates, but also in their interpretation. With the average roentgenologist, the plates and their interpretation are not to be regarded as of absolutely positive or negative value, but only as corroborative or non-corroborative, taken in correlation with other signs subjective and objective. History, laboratory findings, and the result of X-ray examination should all be carefully considered in coming to a conclusion. Even then, at times when everything seems to point to the presence of an ulcer, operation may fail to disclose such a lesion, and the pathology may be found in the appendix or the biliary tract. While the gall-bladder and the appendix are the two organs, disease of which produces symptoms simulating ulcer, the possibility of a lesion of the large bowel must never be overlooked.

In this group of 55 cases, or 51.4% of the total number, the age of the patients varied from 17 to 67 years, and the duration of symptoms from 5 months to 30 years. Fifteen of these patients were treated by gastro-enterostomy without any direct treatment of the ulcer. Of these, 11 (all

FIG. 2.—Pylorus crushed and ligated with fascia November 15, 1915. This picture taken April, 1921.

showing stenosis) or 73% reported cured (6 to 12 years after operation); 2 were improved, and 2 could not be traced. The 2 cases in which only improvement followed operation were ulcers on the anterior wall, and in the ones untraced the ulcer was similarly located. Fifteen cases were treated by posterior gastro-enterostomy with infolding of the ulcer. One was improved, and

the remaining 14, or 93%, were cured (1 to 9 years after operation). In 7 cases, the ulcer was destroyed by cautery, and all were cured (1 to 2½ years after operation). The pylorus was crushed and ligated in 15 cases with the same result (1 to 7 years after operation). In 3 instances, pylorectomy was done because the hard, nodular ulcer, suggesting malignancy, extended beyond the pyloric sphincter, and all report themselves well (2 to 6 years after operation). Thus, in the whole group, 50 cases, or 90% were cured, 3 were improved, and 2 untraced.

All surgeons are not in complete agreement as to the operative procedure to be applied in the presence of these ulcers which vary so much in size, location, and degree of inflammation. Much doubt has been cast on the efficacy of the surgical measure which has ligation (blocking) of the pylorus as the essential. In my hands, crushing of the pylorus and its ligation with a strip of fascia has been very successful, both with regard to the production of a permanent and complete obstruction and with regard to the securing of lasting relief of the symptoms. (See Fig. 1, 2, 3, 4 in proof of the permanency of the obstruction thus produced). In my opinion, the Finney operation has its most successful field in the treatment of pylorospasm, and is not widely applicable in the surgery of duodenal ulcer. The best results will be obtained by combining gastro-enterostomy with destruction of the ulcer (by excision or with the cautery) with infolding, or with ligation of the pylorus. Ulcers of the anterior wall are best treated by excision or by destruction with the cautery. Ulcers of the posterior wall, ulcers involving a great part of the circumference of the gut, and those in the neighborhood of which a diverticulum is found offer a more troublesome problem. Speaking from my own rather limited experience, I believe that there is considerable danger in attacking certain extensive ulcers (such as those I have just mentioned) with the cautery. It is quite impossible for a surgeon to gauge the amount of destruction done by a cautery; should the cautery come in close proximity to the wall of a sizable vessel and necrosis follow, a serious post-operative hemorrhage may be the result. I have seen two profuse hemorrhages occur 48 hours after the application of such treatment. In the presence of such an extensive pathologic process, it is my custom to crush the pylorus and then ligate it with a strip of fascia (about 4 inches long and ¼ inch wide) taken from the anterior sheath of the rectus. The knot tied with this fascial strip has a tendency to slip, and I always transfix the fascial knot with a Pagenstecker suture and tie the latter firmly. (See Fig. 5).

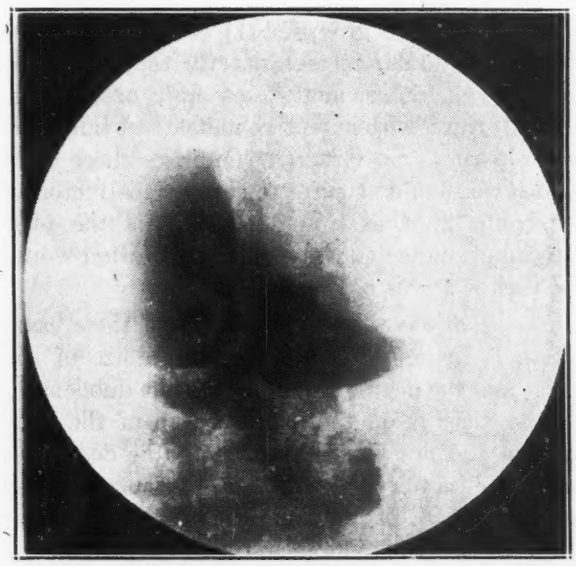

FIG. 3.—Pylorus crushed and ligated with fascia removed from the rectus sheath. This picture taken four months after operation.

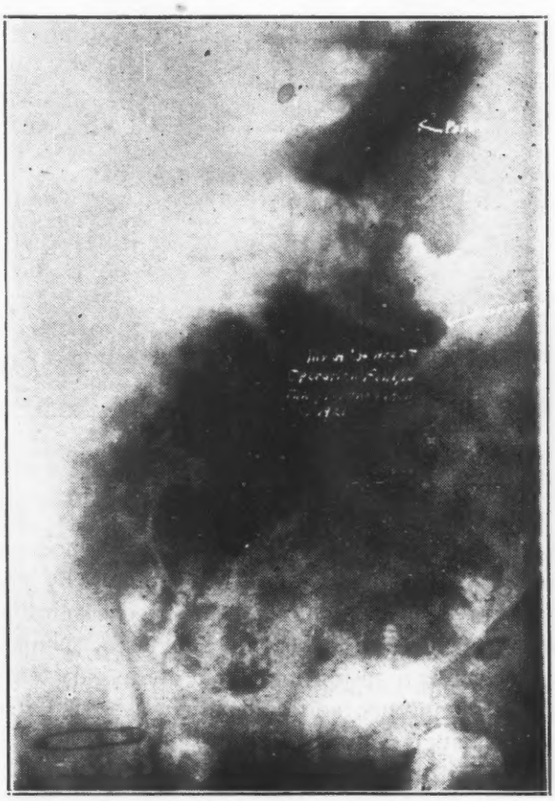

FIG. 4.—Pylorus crushed and ligated with fascia Feb. 1, 1916. This picture taken in July, 1921.

Miscellaneous group: In 4 cases of pylorospasm, pyloroplasty was done by the Finney method: 75% were cured, and 1 case remains

unimproved. One has died since from a cerebral hemorrhage. In one case of gastric ptosis, suspension was done in 1912, and the patient has been well ever since. In a case of syphilis, gastro-enterostomy had been performed by a well-known surgeon without relief of the patient's symptoms. At the second operation, a gummatous condition was detected on the lesser curvature which readily cleared up under proper medical treatment. In one case of duodenal kink at the junction of the descending and transverse portions, gastro-enterostomy was done; the patient reports himself as cured. One gastro-enterostomy was undone. One gunshot wound of the stomach died 24 hours after operation. One perforated duodenal ulcer died 5 days after operation.

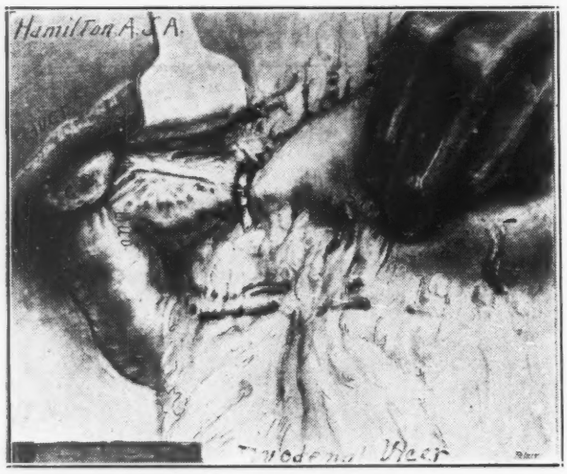

FIG. 5.—Pylorus crushed and ligated with fascia removed from the rectus sheath.

Conclusions: In summing up, it is my opinion that all chronic gastric and duodenal lesions (syphilis excepted) which show by the X-ray a deformity should be treated surgically. When an ulcer once becomes calloused, medical treatment can result in only a temporary cure of the symptoms, and the patient is still liable to the dangers of hemorrhage, perforation, and subsequent malignancy (in the gastric ulcers). Another point that must have consideration is the long time required for proper medical treatment in comparison with prompt relief usually afforded by surgery. The majority of the patients treated by surgery are back at work within two months.

Gastric ulcer: The treatment of a gastric ulcer depends upon the size of the ulcer and its location. If it is located at the pylorus or on the lesser curvature near the pylorus, a pylorectomy or partial gastrectomy is indicated, with a side-to-end gastro-jejunostomy. If the ulcer is located high on the lesser curvature, a more extensive gastrectomy, with a posterior or anterior gastro-enterostomy, should be performed. The sleeve operation should not be done, because subsequently the patient often develops constriction at the point of anastomosis. Every ulcer should be regarded malignant until proved otherwise by the pathologist, and an extensive removal of the glands is advisable. Barring accidents and with proper technic, there is no reason for a surgeon to expect shock or hemorrhage after the average gastrectomy. All vessels should be doubly clamped before dividing. Gentleness of operative technique usually means a comfortable convalescence for the patient.

Gastric cancer: Cases of cancer may be divided into three groups: (1) those without extensive glandular metastases, (2) those with extensive glandular metastases and obstruction, and (3) those with extensive metastases but without obstruction. Group 1 comprises those cases which we should attempt to cure by gastrectomy; in group 2, a gastro-enterostomy is the only procedure indicated; in group 3, operation would be useless and is contra-indicated.

Duodenal ulcer: The treatment of these cases depends upon the location and the size of the ulcer and the degree of mobility of the duodenum. If the ulcer is on the anterior wall of the duodenum and not too large, it should be destroyed with the cautery. In all cases of ulcer of the posterior wall, of annular ulcers, and of diverticula, I crush the pylorus and ligate it with fascia. The ligation method is applicable to all types of duodenal ulcer, while the destruction by cautery or by infolding is limited to those of the anterior wall.

CHRONIC ARTHRITIS—SOME PHASES IN ITS ETIOLOGY AND TREATMENT*

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AT the present time the cause of chronic arthritis is not known, and as a result its treatment is empirical. Chronic arthritis has always been a disease somewhat ill defined and misunderstood. In ancient medicine, sickness was thought to be due to some distemper or rheum, as it was called, and arthritis being especially under the influence of these evil humours was called rheumatism. Since then, up to the present day, its etiology has been loaned to any hypothesis which might be acceptable to medical fashion. Even its individuality as a disease entity has been common ground for dispute. Indeed, modern medicine has established the etiology of many cases formerly included in this category, and these cases may be given a more rational classification.

Such cases can be separated into three groups: first, those cases in which the arthritis is a manifestation of some other disease, as for example, gout, locomotor ataxia, hæmophilia, scurvy, possibly acute rheumatic fever; second, those cases in which the disease is secondary to some known infection, caused by various organisms, such as the tubercle bacillus, the pneumococcus, streptococcus, staphilococcus, gonococcus, the so called infectious arthritides; and third, those cases secondary to some disease of uncertain origin, such as scarlet fever, influenza, measles. Into the various groups, however, only a minor fraction of the cases can be so placed, and the remainder may still be described as chronic arthritides of unknown etiology. As to the nomenclature of this latter group, one might say that medical literature is a maze of terminology which adds little more than confusion. With our present knowledge of pathology and pathogenesis of this arthritis there is fortunately a tendency to adopt a classification as simple and non committal as possible. Arthritis Deformans is the name now generally applied to the disorder, and usually a division is made into the two sub groups, rheumatoid arthritis and osteo-arthritis. Rheumatoid arthritis is typically a poly-arthritis with pathological change in the synovial membrane and periarticular tissues. Osteo-arthritis is characterized more by hypertrophic bone changes. Both processes, however, may be seen in the same individual and it is doubtful whether arthritis deformans, in the clinic, can be divided by any hard and fast lines. McCrae (1) classifies the disease according to the predominance of the pathological change, adding a third group where bone atrophy is marked. His subdivisions, then, would be:—Arthritis Deformans—(a) with periarticular changes predominating, (b) with atrophic bone changes predominating, (c) with hypertrophic bone changes predominating. There is still left, however, a group in which no pathological change is demonstrable. Such cases have been called toxic, toxemic, infectious arthritis, chronic rheumatism, and so on. Usually they are milder and run a shorter course than true arthritis deformans. But sometimes they go on and show permanent pathological change. In what follows, I have used for convenience the term arthritis deformans to cover all types of arthritis of unknown etiology.

While the cause of arthritis deformans has not yet been established, there is a growing conviction that the disease is a bacterial process. This hypothesis was first defined by Schuller (2) in Germany, 1893, and by Bannatyne and Wohlman (3) in England in 1895. Since then, announcement has been made by many investigators that organisms had been isolated by them from the inflamed joints—Poynton and Paine and Rosenow make the most positive claims—but opposed to their results are the almost constantly negative findings of investigators in every country. The clinical picture, however, strongly suggests an infection and experimentally joint disease is readily produced by the intravenous injection of bacteria. In dogs, the disease may be simulated by the experimental inoculation of streptococci. This has been done by many workers and

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Nathan (4) states that by injecting streptococci intravenously into puppies, he obtained a joint inflammation, which went on to chronic deforming arthritis, and from the joint fluid or tissues no organisms could be obtained on culture.

This view that arthritis deformans is a chronic infection has completely changed the manner of its treatment. The clinical investigation is centred upon a search for some focus of infection, which if found is treated in radical fashion. Vaccines have also been used extensively. Removal of infectious foci sometimes brings about complete recovery and in other cases, it is followed by very considerable improvement. These effects are definite enough to demonstrate that infective foci may be intimately associated with joint disease. On the other hand, no focus may be found or, if found, its removal exerts little or no influence on the course of the illness.

It is common experience, on the other hand, that many factors favourably influence the different rheumatoid affections in individual cases; such as for example, change of climate, rest in bed, improvement in health, change of diet. And it is well known that these same factors in other patients have, apparently, no effect whatever. While reference to the influence of diet is repeatedly met with in medical literature, doubt is often expressed as to its real value, and there has been a general lack of agreement as to what changes of diet should be instituted. The failure to separate the gouty arthritides from true arthritis deformans has added further complication, and to this may be attributed the popular custom of restricting meats in all rheumatoid conditions. One form of dietetic regulation has been advised several times in recent years, namely, dietetic reduction. Fifteen years ago, Chittenden drew attention to the disappearance of chronic inflammation of a joint when he was experimenting with low diets. Guelpa, in France, the founder of treatment by starvation and purgation, includes rheumatoid arthritis among the diseases for which it is especially applicable. Pemberton for many years has been recommending reduction of diet in suitable cases, laying especial emphasis on the restriction of carbohydrates.

Over two years ago, an investigation was begun in the medical wards of the Toronto General Hospital to determine the importance of dietetic treatment in this disease and if possible to lay down some general principles as to what measures should be carried out. At first the carbohydrates were restricted in certain cases, in which all other forms of treatment had failed, with the result that quite marked improvement occurred in some cases and none in others. Later, it was found that better results were obtained by a more general reduction of diet, allowing plenty of "vitamin-containing food", and adequate protein. The uncertainty of the treatment, however, made it desirable to find some clinical indication for this line of treatment.

About this time, Pemberton and Foster, (5) in a series of metabolic studies in chronic arthritis, reported a lowering of sugar tolerance following the standard glucose meal. This test consists of the determination of the blood sugar curve following the administration of 100 gms. of glucose. These observers concluded that the lowering of sugar tolerance was the result of the disease and varied with its severity. In repeating this work, we also frequently found this lowering in sugar tolerance, but our results were not in accord with their conclusions. We found in many mild cases a well marked lowering of the tolerance, and in some severe ones, only a slight lowering thereof. We, therefore, carried out this test in all cases of chronic arthritis subsequently treated by dietetic means, to determine whether or not a study of the sugar metabolism might not reveal the probability of improvement by this treatment. We have now made a systematic survey of some 150 unselected cases of arthritis deformans, in which, under careful control, the effect of dietetic treatment has been observed and in which the sugar tolerance has been estimated.

A more or less general routine was carried out for all these patients. After rest in bed for at least two weeks, and after the disease had reached a stationary stage, the patient was given daily six glasses of milk and three of butter-milk, one or two oranges, half a grape-fruit for one week. This amount was then gradually increased by the addition of vegetables and fruits containing less than 15% carbohydrates, eggs, fish, fowl, meat, soups, junkets and jellies, and finally brown bread in small amounts, giving a daily intake of 1,500 to 2,000 cal. in four weeks' time. Those under weight were allowed in addition cod liver oil and cream. This four weeks represented the period of observation on which the results recorded here were based, but many patients have carried on since then with a diet chosen largely from the foods mentioned. During this period of four weeks, no other form of treatment

was given except that the bowels were moved by enemata when necessary on alternate days, and that in a few cases liquid paraffin was given by mouth.

The results leave no doubt that careful dietetic regulation must be given an important place in the therapy of this disease. Four months ago, a special analysis of the first 100 cases was made for publication with the detailed reports of the sugar tolerance results (6). Of the 100 cases, 8 recovered, 43 were much improved, 28 were improved and 21 showed no improvement. (Table I). Those cases reported as improved showed relief in some form from the symptoms of the disease, especially pain, and also as a rule improvement in general health. In those reported as much improved, there was definite evidence for this on examination, such as decreased swelling, increased range of movement and relief of muscle spasm. Usually such improvement set in by the 4th to 7th day and continued for some weeks: sometimes the improvement was immediate and quite striking; occasionally it was delayed and appeared towards the end of the four weeks' period. Even more marked than these results was the improvement in general health. These patients were often anæmic, easily tired, sleepless, neurotic; they complained especially of disturbances relating to the digestive system, constipation, abdominal pain, eructation of gas, lost or excessive appetite. These symptoms generally became much less marked and sometimes even disappeared. On the other hand, it was unusual for a patient to experience much discomfort from the rigidity of this dietetic regime. Three patients were relieved of chronic eczema. A fall in temperature of one or two degrees was sometimes seen 48 hours after beginning treatment. Those underweight tolerated the low intake very well, and any loss in weight was afterwards made up without much difficulty. In those overweight, a loss appeared to be a distinct advantage and the patient was urged to continue his restricted diet. For most patients, however, it is desirable to ultimately increase the diet, giving the energy containing food more freely in the form of fat than in the form of carbohydrate. A high fat diet has recently been advised by Hubbard (7) for the treatment of chonic arthritis. When a patient had shown no benefit from his four weeks' course, he was not advised to continue; it may be added that no ill results were seen in those who were not improved. Table I also gives a separate tabulation of the results in men and of the results in women. From this, it is evident that women, as a group, are much more favourably influenced by dietetic treatment than are men.

TABLE I

Summary of the Results of Dietetic Treatment

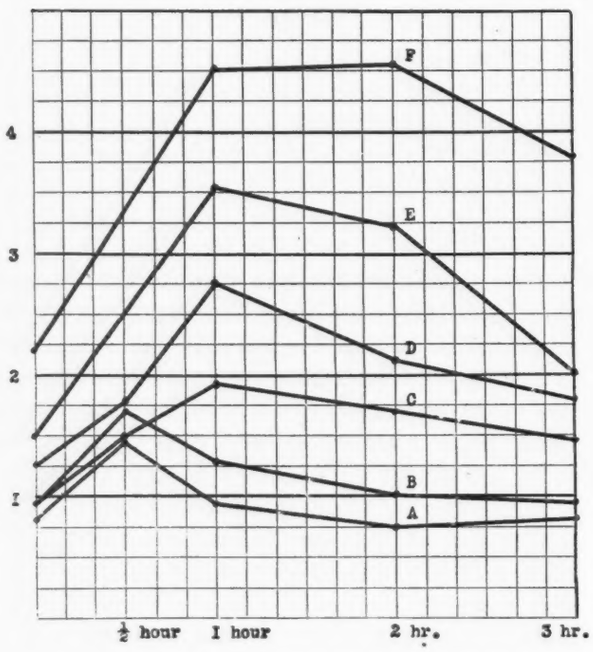
	Total	Male	Female
Recovered	8	0	8
Much improved	43	14	29
Improved	28	10	18
Not improved	21	13	8
Total	100	37	63

The sugar tolerance test was carried out according to Hamman and Hirschman. After a fast of fifteen hours, 100 gms. of glucose was given in 300 c.c. of water, with the juice of half a lemon; 250 cc. of water, one and two hours afterwards. Blood sugar estimations were done at varying intervals, afterwards, usually 1 hour, 2 hours and 3 hours, but sufficient information may be obtained from the 1½ and 3 hour determinations. Folin and Wu blood sugar methods were used. The generally accepted normal for the blood sugar curve, after administration of 100 gms. of glucose, is one which from the fasting level of .6 to 1.2 mgs. per c.c. does not rise above 1.7, and returns to the original level in less than 1½ hours. A curve, then, which rises above 1.7, or which does not return to the fasting level in 1½ hours, denotes what has been called a low sugar tolerance. Various degrees of lowering in this tolerance were seen in the cases studied. For purposes of comparison, an average has been made of the blood sugar readings following the glucose meal; that is to say, an average of the 1, 2 and 3 hour determinations, or of the determinations made at 1½ and 3 hour intervals, and an arbitrary grouping of the cases has been made according to these averages:—group 1, cases in which the average was less than 1.4; group 2, cases in which the average is from 1.4-2, and group 3, cases in which the average is greater than 2.

Examples of different curves are shown in Figure 1. Curves A and B are typical of a normal tolerance (Group 1). Curve C shows a tolerance moderately lowered (Group 2). D and E are curves showing a more marked lowering of tolerance (Group 3). F is the curve of a case of moderately severe diabetes, which was admitted to the hospital as one of chronic arthritis. It should be pointed out that the fasting blood sugar does not always vary with the height of the curve. In other words, a patient,

who has a markedly lowered tolerance, may have a normal blood sugar.

FIGURE I



The results of treatment in the different cases, grouped according to the sugar tolerance, is given in Table II. Those which were simply improved, *i. e.*, those who showed subjective improvement only, are placed with those who showed no improvement, since subjective improvement is a very uncertain quantity. Cases showing objective improvement and those which recovered are also given together. Of 24 cases with good sugar tolerance, Group 1, 3(12.5%) showed objective improvement. Of 56 cases in Group 2, 31 (55.3%) showed similar improvement, while in Group 3, *i. e.*, cases with well marked lowering in the tolerance, of 20 cases, 17 (85%) showed objective improvement. These figures demonstrate that there is a fairly close relationship between the response to dietetic reduction and the sugar tolerance. 56% of the cases, however, are in Group 2, where a definitely favourable result was obtained in slightly over half its number. In these patients, some further idea of the probable benefit of treatment may be obtained by an examination of the patient's diet. Those whose diet formerly consisted largely of carbohydrates offer a better prospect of improvement when put on the dietetic regime outlined above.

Since the analysis of these 100 cases was made, many more have been so treated with similar results. I have also had an opportunity of following a few cases among returned men. These were all obstinate cases of some years' duration. Those with a low sugar tolerance as a rule received very considerable benefit; those with a good tolerance showed little or no improvement.

TABLE II

The Effect of Treatment on Cases Grouped According to the Sugar Tolerance

Average Blood Sugar reading for 3 hours....	Less than 1.4	1.4 to 2	More than 2
Recovery or showing objective improvement ...	3 (12.5%)	31 (55.3%)	17 (85%)
No objective improvement	21 (87.5%)	25 (44.7%)	3 (15%)
Total	24	56	20

In Table II, a separate record is made of the results in men and in women.

TABLE III

	Less than 1.4		1.4 to 2		More than 2	
	Men	Women	Men	Women	Men	Women
Recovery or showing objective improvement...	0	3	12	19	2	15
No objective improvement	15	6	8	17	0	3

The clinical significance of this investigation might be discussed briefly. It shows the clinical importance of dietetic control in this disease, and it has been also demonstrated, since such treatment may be inconvenient or tedious, that the sugar tolerance test is a useful clinical indication of the value of such treatment in individual cases. Besides this, the correlation of the effect of diet, and the degree of the lowering of sugar tolerance, seems to show that in many cases sugar metabolism is associated with the cause of the arthritis. This view received some support from clinical experience for it was found that the administration of excessive carbohydrate would sometimes bring on an exacerbation of the disease. Such a view is not incompatible with the infectious theory of its etiology, and it was evident that, in those cases which received benefit by this treatment, there were the same clinical signs of infection as in the other cases. It is well known that infections may be influenced by diet; for instance, the clearing up of boils in a diabetic by restriction of the food intake. The frequency of infections in animals, deficiently fed, may have some bearing on this point, and the whole question of food balance must be given careful consideration in interpreting the above

results. Deficiency disease usually occurs in animals when the diet is low in vitamine and protein, but other factors must be taken into account. The work of Colonel McCarrison is especially suggestive in this connection, for he has shown that deficiency disturbances occur much more rapidly in animals when carbohydrate is supplied in excess. Considerable clinical evidence has been published to show that vitamines have a therapeutic value in chronic arthritis. This has been our own experience; for example, many cases may be much improved by the administration of cod liver oil, and occasionally improvement is seen after the administration of yeast. Careful scrutiny of the diets of arthritic patients will often reveal lack of balance in their food, the most frequent being inadequate or unsuitable protein, insufficient vitamine and carbohydrate excess. Sometimes, the simple restoration of a proper food balance will result in relief of symptoms. The part played by fats is not quite clear. Experimentally, excess fat accelerates deficiency disease and, as has been said, restriction of fat certainly appears to be beneficial in those patients over weight. In patients under weight, the administration of fat, high in vitamine content, seemed to be beneficial.

The better results obtained in female patients is also significant. It is my opinion that the reason for this is that dietetic unbalance is much more common among women. Their manner of living and also some inherent differences of metabolism may be other factors to be considered.

It should be finally emphasized that this paper has attempted to deal with one phase only of the treatment of arthritis deformans. Foci of infection should always be looked for, and if possible, removed. There is no doubt that dietetic treatment is much less effective if such foci are left untreated. After the course of treatment described, it has often been found worth while to carry on with various forms of hydro and physio-therapy. Cinchophen is quite useful in a small group of cases, even when no evidence of gout can be found. Salicylates are less frequently of value. Other forms of treatment prove to be of value in various cases. The results, however, reported here were carried out under careful control, and must be attributed entirely to the dietetic treatment.

To sum up then:—It appears that arthritis deformans is an infectious or toxic process, which may frequently depend upon a disturbance of nutrition or of metabolism, and that benefit may be obtained by dietetic treatment, directed towards the control of such a disturbance.

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Decapsulation of the Kidneys.—Fawcett (*Guy's Hospital Gazette*, January 21st, 1922) discusses decapsulation of the kidneys in subacute or chronic parenchymatous nephritis, and quotes the case of a man, aged 39, suffering from subacute tubal nephritis, with some interstitial change and uræmia. Under treatment in hospital for three months the blood urea fell to normal—namely, 0.29 gram per litre—and his general condition improved, the hæmaturia disappeared, and the œdema, headache, and dyspnœa became less, though the quantity of albumin remained high at 8 to 10 parts per 1,000. During two months' absence from hospital the symptoms returned and decapsulation of both kidneys was performed. The patient rapidly recovered from the operation, and within three or four days the œdema and albumin became considerably lessened, though not entirely disappearing, and his general condition has remained satisfactory. The presence of cardio-vascular and interstitial changes in addition to the tubal nephritis accounted for there not being still greater improvement, since such good results cannot be expected in the former type of case as in the latter. Decapsulation is contraindicated in all cases of advanced granular kidney with high blood urea and deficient urea excretion.—*Brit. Med. Jour.*, June 3rd, 1922.

BONE SUPPURATION THE BASIC CAUSE OF RENAL CALCULUS IN TWENTY CASES FOLLOWING WAR-WOUNDS*

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IT is very doubtful if any definite conclusions could be drawn from a review of the very extensive literature dealing with the etiology of stone in the kidney, and such a review is obviously beyond the scope of this article. To illustrate the trend of medical opinion, however, the citation of a few representative opinions on this etiology is considered justifiable.

In 1821, Prout of London gave as the principal causes of lithic acid in the urine, simple errors of diet; unusual and unnatural exercises of the body and mind, particularly after eating; the want of proper exercise at all times, and debilitating circumstances. Seventy years later, Lagueu of Paris gave as the principal etiological factors, sedentary occupations and hereditary predisposition, at the same time concluding, from a review of a considerable number of cases, that renal calculus occurred more often in the male and was most prevalent in the fourth decade of life.

In 1909, Schade, after extensive experimental and clinical observation, concluded that irreversible colloids, the commonest example of which was fibrin, are necessary for the formation of calculi and was of the opinion that fibrinuria in slight degree occurred more often than was commonly thought.

In 1910, Sir Almroth Wright suggested that a search for a bacterial cause be made in every case of urinary calculus. He, later in the same year, reported four cases of his own.

In 1913, Ohlmacher of Detroit, writing from the point of view of one doing special practice devoted to therapeutic immunization, states that the concurrence of bacteriuria and urinary calculi has long been known, and draws the following conclusions:—

1.—"The routine bacteriologic analysis of all cases of renal calculus and the associated pyuria and bacteriuria, is indicated."

2.—"Therapeutic immunization with autogenous bacterial vaccines should be attempteр in non-operative cases of calculus, pyuria and bacteriuria for the relief of bladder irritability and impaired general health, and in cases in which there has been operation, when the symptoms persist unduly."

In 1918, Hugh Cabot in 'Modern Urology', discussing the etiology of renal calculus, concludes as follows:—"Supersaturated urine is secreted by the kidney under certain conditions which are at present unknown. In this supersaturated urine, crystallization occurs. These crystals, under certain conditions of retention, are held in the urinary tract for a time sufficiently long to enable them to grow to a size which constitutes a true concretion or calculus. Infection is a factor only insofar as it gives rise to conditions favouring retention and in that it affects the chemical composition of the stone."

In 1920, C. H. Mayo regards the infection theory of the origin of kidney stones as the only tenable one, and compares the development of stone in the kidney to the development of the shells of fresh and salt-water molluscs which are built up by the bacteria feeding on the pabulum of the exuded mucoid material of the molluscs. If these bacteria become misplaced within the body of the mollusc, a pearl or slug develops as a result of such misplacement. He concludes "Stone formation is evidently the result of the combination of two types of bacteria; the first creates an infarction with minute necrosis causing mucoid exudate; the second factor is the elimination, at the same time, of the stone-forming bacteria that they may come in contact with the mucoid material. If the stone originates in the cortex of the kidney, its growth will be slow, but if it originates in the calyces or pelvis, growth may be much more rapid because of the ease with which its chemical material is secured."

Bone suppuration, or osteomyelitis, is described by Stengel and Fox as an infective disease resulting from hematogenous infection in the course of various diseases, from local infections, in cases of traumatism (fracture, amputa-

*Read before Section of Surgery, Academy of Medicine, Toronto, February 21st, 1922.

tion) or from periostitis. Various micro-organisms, including staphylococci, streptococci, typhoid bacilli and the bacillus coli communis, have been recovered from the blood.

References, or case-reports, pointing to any special relationship between osteomyelitis and renal calculi are very few in the literature of either disease. Le Fur, in the discussion of Mayet's article, reports a case as follows:—"We recall a case of a young fellow of 20, who, following injury to the marrow (moelle) by a bullet, had a vesical retention which was immediately treated by cystotomy; he presented, without infection, a bilateral renal lithiasis.....which I successfully operated upon."

Mayet's case reported in the above mentioned article, was a boy of seven years immobilized for Potts' disease, in whom an abscess, which developed in the left iliac fossa, was repeatedly aspirated and injected. Four years after the abscess disappeared, hematuria developed and radiology showed, beyond doubt, the presence of a calculus in each kidney. The author is inclined to attribute these calculi as being secondary to a renal tuberculosis, though admitting that the inaction and the excess of phosphates ingested had quite possibly facilitated the production of the renal calculi.

In the discussion of this case, Cathelin did not believe that the immobilization or the ingestion of lime phosphate had very much to do with it; he thinks there were bacilli in the urine.

Pasteau, in the same discussion, says "It seems that there are cases of injured who have wounds of the marrow..... Infection is the rule in these cases at the end of a certain length of time and death comes on by renal infection and the formation of secondary calculi."

Many cases, no doubt, are to be found in the literature in which renal calculi are described as associated with, or follow, bone suppuration or injury, but are not reported with special reference to the etiology. For instance, Hugh Cabot in 1910, among representative cases given to illustrate the operative technique, reports the following:—

"A man, aged 34, suffered a severe crushing accident involving the left hip from which he recovered with considerable stiffness and some shortening of the leg. About a year after the accident, he passed a stone from his bladder, which troubled him only in its passage through the urethra. Three years later, renal colic and hematuria drove him to the hospital. Stone in the left ureter was shown by X-ray, and removed by proper incision. Recovery was uneventful."

Rosenow and Meisser in a recent article report the production of calculi in five out of six healthy dogs by sealing a culture of streptococcus repeatedly isolated from the urine of a case of nephrolithiasis into the teeth of the dogs.

They state:—"The evidence of infection of the urinary tract, and the lesions in the kidney were slight except where obstruction in the ureter had occurred from impacted stone.

The same streptococcus was isolated from the kidneys, from some of the stones, and from the teeth of the dogs, and its elective affinity for the medulla of the kidney in rabbits, on intravenous injection, was demonstrated; it was found in the lesions of the collecting tubules where crystallization and stone-formation were beginning."

As all personal cases here reported occurred in ex-soldiers, it may be asked:—Are men on active service for several years, pre-disposed to the development of renal calculi? No statistics are available to enable one to give a definite answer to such a query.

The frequency of calculi in the urinary tract in the French army, has been pointed out by Rochet and Boulouneix, as well as by F. Cathelin, the first-named surgeons having seen as many as 42 cases, the latter, with his colleagues, having operated 6 cases of stone in the kidney, and seen a dozen others. All of these cases, however, occurred in men of middle age and no bone lesions are mentioned, and, aside from the fatiguing life in the field, no specific mention is made to an etiological factor.

Herewith are given short synopses of twenty cases of nephrolithiasis which have come under observation during the past three years at the hospitals of the Department of Soldiers' Civil Re-establishment situated in Toronto.

All tests of renal function by the administration of phenolsulphonephthalein and indigo-carmine were done intravenously. Four of the earlier cases were operated by Dr. N. S. Shenstone and the laboratory work was done under the supervision of Dr. G. W. Lougheed.

All the cases here reported, occurred in men. The oldest was 37 years, the youngest, 22 years, the average being 28.5 years. Eleven occurred in the third decade of life, nine in the fourth decade.

Five patients had been subjected to thigh amputations, and were consequently less active in their habits of life during the two or three years

RESUME OF CASE HISTORIES

No.	1	2	3	4	5	6	7	8	9	10
Age	23	22	31	27	27	27	30	37	29	25
Exam'd	22-4-19	16-6-19	Oct 1919	1-10-19	6-2-20	6-4-20	9-6-20	10-10-20	12-12-20	15-12-20
Wound and date	shrapnel back 24-4-15	legs and back 15-8-17	chest Aug. 1918	fracture CPD left femur Nov. 1917	wound and amputation rt. thigh	fracture wound femur, June 1916.	wound rt. thigh, amputation 27-9-18	wound of chest, Aug. 1917.	wound right shoulder, leg and back. 18-4-18.	wound of rt. thigh, Apr. 1916
Complications	Paraplegia catheterization		boils				catheterization.	Hæmothorax phlebitis rt femoral temporary paraplegia		osteomyelitis, 3 years. perinephritic abscess Feb. '20.
Suppuration	5 mos.	13 months	9 weeks	4 months	prolonged	5 weeks.	6 months.	prolonged	6 weeks.	prolonged
First sign of stone	3½ years after wound colic	5 months after wound colic	1 year after wound colic	19 months after wound colic	1 year after wound hæmaturia	3½ years after, colic	14 months after, colic	colic, 5 months after wound	colic, left, 1 year after wound.	colic Rt. 4 years after wound. Aug. 1920
Course	repeated attacks of colic	calculi formed again	repeated attacks rt. renal colic	repeated abdominal pain calculus in ureter seen by cystoscopy	repeated abdominal attacks	repeated colic and Hæmaturia right	repeated colic, 14 months, left loin.	repeated attacks, first left then right. Feb. '18, operation, right not completed. Sept. '18, 5 stones from right May '20, 1 stone from left, Abscess in right loin. scar. septic Dec. '20, 1 stone from right.	slight pain, hæmaturia	repeated attacks.
Radiogram	calculi in left kidney pelvis	calculi in rt. ureter	pyonephrosis and stone	negative	1. June 1919 stone in rt. ureter. 2. Aug. 1920 stone in left kidney pelvis.	1. negative. 2. stone rt. ureter 14-1-21.	stone in left kidney pelvis.	stones shewn in both kidneys. on various occasions.	stone in left kidney.	stone in right.
Urine	B. coli staphylococci	infected	infected staph-aureus	pyuria		infected. pus, blood	infected blood.	pus and blood.	pus, blood.	pus. cocci
Phthalien	42%	little or no change	48% rt. low	normal	53%		48%	left 30%. total 40%.	56%	low.
Treatment	pyelotomy removal of stones	calucli removed 10-2-19 and Dec. 1920 by dilation of ureter	nephrectomy	calculus removed through cystoscope	1. passed per urethram. 2. nephrotomy left removal of stone.	dilation of ureter. stone passed.	pyelotomy June 1920	two nephrotomies. right one pyelotomy,	pyelotomy 27-1-21.	removal of pyo-nephrotic kidney and stone 31-12-20
Results	recovery	recovery	recovery	much improved	recovery	recovery.	recovery.	recovered.	recovered	recovery

RESUME OF CASE HISTORIES.—*Continued*

No.	11	12	13	14	15	16	17	18	19	20
Age	34	33	24	25	32	31	37	33	26	27
Exam'd	15-12-20	3-1-21	25-1-21	22-2-21	3-6-21	13-6-21	13-6-21	28–6-21	5-9-21	25-1-21
Wound and date	right knee 30-9-18	31-3-17 multiple wounds and amputations	wound rt, thigh, 13-8-17	wound of rt. lung. 16-7-18	wound of left arm. 26-9-18.	wound of back and knee joint. 22-12-17	fracture of femur 12-11-15, wiring.	wound of left arm loss of rt. eye. 20-3-16	wound rt. thigh and buttocks. 12-8-18.	wound of left thigh 14-3-17.
Complications		hæmorrhage and repeated operations.	amputation	hæmoptysis.	influenza.	amputation. Jan. 18. amputation, 1919		Five opertions on arm.	Trench fever 1917.	sequestra discharged. 2 later operations
Suppuration	2 years.	6-8 mos.	2-3 years	1 month.	2 months.	3 months.	7 weeks.	prolonged	6 weeks.	6 mos.
First signs of stone	colic two years after wound	hæmaturia, pain in right loin, after 9 mos.	colic, 3½ years after wound	colic on left. 2½ yrs. after wound.	pain in back. albumen. nephritis? 9 mos. later	1921 aching. May 1918, sand in urine.	pain in left loin. 4 mos. after operation.	April 18, pyelitis, rt. no stones found.	Aug. '19, pain in left groin.	Jan. 1918 rt. side pain, appendix removed.
Course	Nov. 1920 patella removed, joint cleaned out. Repeated attacks of colic.	repeated attacks, right renal colic.	repeated attacks	pain one year then colic. right and left.	20 mos. after the wound, rt. renal colic. hæmaturia. rt. ureter.	June 1921, bloody urine. severe pain in left loin.	persistent. pain considered nephritis.	repeated attacks of colic.	pain, fever, bladder irritation, treated for nephritis for 18 mos.	repeated attacks of pain on right side in groin from Jan. 18-Aug 19. nephrotomy stone removed. rt. recurrence Nov. 1921
Radiogram	shewed no stone.	1. small stone. 2. large stone later in same spot. Rt.	stone in rt. ureter	calculi in right and left.	stones in right kidney and ureter.	stone in left.	stone in left kidney. pelvis.	stone in rt. ureter 28-6-21.	stone in left ureter. 5-9-21.	1. stone in right. Aug. 1919 2. large stone in same kidney, Nov. 1921.
Urine	infected.	infected staphylococcus. blood.	infected	infected indigo carmine test good-left.	infected.	infected.	pus and blood	Sterile on Culture	infected. left-pus. B. coli.	pus and blood.
Phthalein		52%	normal.	34%	good. excretion.	good excretion.			good.	60%
Treatment	cystoscopy, stone removed. rt. ureter	18-1-21 pyelotomy. large stone removed.	dilation of ureter. stone passed into bladder, removed by cystoscope.	30-3-20 rt. pyonephrotic kidney removed, 9 stones. left renal colic again. pyelotomy	ureter dilated, stone passed.	lavage of both kidney pelves.	24-6-21 pyelotomy large stone. mulberry.	28-6-21 lavage of rt. kidney pelvis. dilation of ureter.	dilation of ureter. X-ray shewed stone 4 in. lower. 5-9-21. repeated.	ec nd nephrotomy Jan. 1922 after lavage of kidney pelvis. Jan. 1922. soft stone filling middle calyx lavage after operation.
Results	well.	recovery	recovery	drained. recovery	free from symptoms.	improved. some pain 1922	recovery	1 stone passed. X-ray shewed first stone in old place seems well.	stones passed per urethram. x-ray neg. recovery.	meruchrome and silver nitrate. 3 dilations of ureter. infection less, patient still under observation.

immediately preceding. Of the twenty patients, nine might be said to have led a sedentary life of necessity, from the nature of their wounds, while in the remaining eleven no change in the activity of their habits could be said to have taken place.

Three cases were found to have bilateral calculi; of the unilateral calculi, eleven occurred on the right side and six on the left, which proportion of right to left corresponds roughly with the figures of recognized authorities.

Four had previously passed calculi or had had calculi removed.

The average time elapsing from the date of receiving wounds to the date of the first renal symptoms, was 17.7 months, the longest period being 44 months, the shortest, 4 months.

In every case, with the possible exception of case 19, there appeared to be a very definite history of bone-suppuration, with the systemic infection always present with osteomyelitis.

A history of a systemic infection having no relationship to wounds is found in three cases shortly before, or soon after, being wounded, *viz.*, in case 3, furuncles of the trunk and back; in case 15, influenza, and in case 19, trench fever. It would appear to be more than a coincidence that in these three cases the suppurative process in the wounds was of comparatively short duration.

Four of these patients had been subjected to appendectomy, and four had been treated for considerable periods for nephritis before nephrolithiasis was suspected.

The urine from the affected kidney in eighteen of these cases showed well-marked characteristics of infection, the commonest offending organisms being the staphylococcus aureus and the bacillus coli communis; in one case, the urine showed no signs of infection on repeated microscopic examination, but no culture was made, and, in one case, the urine from the affected side was sterile on culture. (case 18).

Staphylococci appeared to be by far the most common infecting organisms, very frequently associated with the bacillus coli, and in no case were streptococci found. In making the foregoing statement, it is admitted that in the great majority of these cases cultures of the urines were not made as a routine, and that microscopic reports on the urines were relied upon. The bacteriology of the urine was investigated in a few cases where post-operative treatment by autogenous vaccines seemed indicated, and in every case the predominating organism proved to be staphylococcus aureus.

The function of the affected kidney, judged by the excretion of phenolsulphonephthalein or indigo-carmine given intravenously, in sixteen cases, was very slightly impaired,—in one, moderately impaired, and in three cases, markedly impaired.

In twelve patients, the calculi were removed by operation; in six, the calculus causing the symptoms was passed or removed after intra-ureteral manipulations, while in two, no removal has been attempted but symptoms were apparently improved and temporary relief given by dilatations of the ureter and lavage of the kidney-pelvis. The diagnoses in these two cases have been repeatedly confirmed by radiology, persistent slight hematuria, etc.

Three of the cases operated had previously been operated for removal of calculi. In several of the latter cases operated, in whom the urine persisted in showing considerable pus from the affected kidney, gradual dilatation of the ureter, with lavage of the kidney-pelvis, has been carried out over a considerable length of time. In a few cases this post-operative treatment has been supplemented by the administration of autogenous vaccines, though no definite benefit from these vaccines alone has been noticeable. In only two cases was marked evidence of retention in the upper urinary tract from ureteral strictures or kinks, misplacement of the kidney, malformation of the kidney-pelvis, found either on cystoscopic investigation or at operation. Investigation of this phase of the subject could, however, have been more thorough.

Conclusions

1.—While definite conclusions, applicable to all cases of nephrolithiasis, cannot be drawn from twenty cases, there is undoubtedly a very definite etiological relationship between the bone-suppuration and the formation of renal calculi in the cases herein reported.

2.—Approximately ninety per cent. of these cases show definite signs of infection in the urine from the affected kidney, which fact, together with the literature quoted, is fairly good presumptive evidence that infection is a definite contributing cause, if not the most important cause, of renal calculi.

3.—Lack of drainage in the upper urinary tract is seemingly not an important primary cause of the formation of renal calculi following such a systemic infection as osteomyelitis.

4.—Sedentary habits of life likewise have no direct relationship to calculus-formation, where such formation follows a systemic infection as osteomyelitis.

5.—If every case of nephrolithiasis could be investigated with sufficient thoroughness, a history of a preceding systemic infection could be elicited. Until such time as experimental and clinical investigation gives us some other definite cause, might not the presence of nephrolithiasis be considered presumptive evidence of a previous systemic infection?

6.—The removal of calculus from the upper urinary tract should be considered only an important preliminary step in the cure, and treatment of the concurrent infection must be thoroughly carried out if recurrence is to be avoided.

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STUDIES IN RADIUM*

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RADIUM is a name to conjure with. Its introduction as a therapeutic agent in the realm of medicine signalizes the inauguration of a new epoch in the forward march of the healing art. At the same time, a word of caution against over-enthusiasm regarding its curative effects and reliance on its properties, to the exclusion of other tried and proven, though less spectacular agencies, is in order.

The element, radium, was isolated from its compound twenty years ago by Madame Curie. It combines rapidly with constituents of the air to form salts of radium, in which form it is used in the arts and sciences. These salts have different physical properties as set forth in the following table:

Radium chloride soluble in water,
Radium bromide soluble in water,
Radium carbonate, insoluble in water, soluble in acids,
Radium sulphate, insoluble in both water and acids.

It will be seen at a glance that the sulphate is the most stable of the compounds. The prospective purchaser of the radium element would do well to stipulate that this salt is supplied in any apparatus he may purchase, and thus guard himself against possible financial loss through damage from an unstable product.

Radium is one of the group of bodies that are said to be radioactive. Briefly, these bodies possess the following distinctive properties:—

1st.—They affect a photographic plate in a manner similar to sunlight.

2nd.—They cause certain substances to become phosphorescent or fluorescent.

3rd.—They cause the air and other gases to become partial conductors of electricity.

4th.—They generate heat.

Madame Curie demonstrated that the heat given off from a gramme of radium would raise an equal weight of water from the freezing to the boiling point every 45 minutes. Heat means

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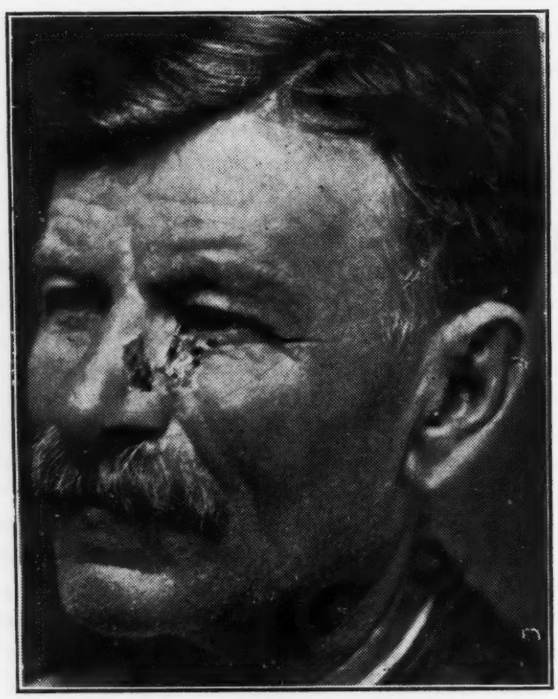
energy—capacity for work. The energy bound up in the radium atom is 250,000 times as great as that of any other atom known to us. It is estimated that the latent force stored up in one gramme of radium is sufficient to raise a Dreadnought of 28,000 tons 100 feet in the air.

CASE 1.—Lupus Erythematosus before treatment.

CASE 1.—Lupus Erythematosus after radium treatments, September, 1921.

In 1803 Dalton formulated his atomic theory. The word atom derived from the Greek meant indivisible, and was applied to the smallest particle of matter known to exist in any chemical element. Of recent years, doubts have been thrown on the doctrine of the fixity and stability of the atom. In the case of the radioactive bodies, it was demonstrated that the atom was breaking up with tremendous velocity, and in the throes of this atomic destruction a new science—that of radioactivity—was born into the world,

CASE 2.—Rodent ulcer of the face. Photograph not retouched. Taken October 4th, 1921, four months after a single exposure of radium subcutaneously.



CASE 2.—June 15th, 1921. Rodent ulcer fifteen years duration. Healed October 4th, 1921, single application buried radium.

for the basic and fundamental change in these extraordinary substances, is the disintegration of the atom.

The rays given off by radium are spoken of as alpha, beta and gamma. The alpha ray has very little penetrating power, A sheet of writing paper will cut it off. It is a negligible factor therapeutically unless the salt is given intravenously, being removed by the walls of the different containers in which radium is marketed. The alpha ray comprises 90% of the radiant energy. The beta ray is 100 times more penetrating than the alpha ray. It is of great service therapeutically in many superficial lesions of the skin or mucous membrane, being credited with penetrating from 1 to 3 centimeters into the tissues. It is unsuitable for long exposure or for deep work, and under these conditions should be filtered out, either partially or entirely. Brass, silver, lead, rubber or other substances are used for this purpose. The beta ray comprises 9% of the radiant energy. The gamma ray is 100 times

Case 3.—Capillary and cavernous naevus upper lip. Excised once. Electric needle four times. Failed to control.

more penetrating than the beta ray. Many of these rays will penetrate through the body; some of the harder rays will pass through a foot of lead. One per cent of the radiant energy is made up of the gamma ray. These rays are given off equally and in all directions. In topical applications more than half of the radiant energy is dissipated in the atmosphere, so that less than one-half of 1% of the total energy is utilized in deep work in topical applications. Even at this, the greatest possible caution must be exercised, or horrible and even fatal accidents may ensue. Irreparable damage may be done in the viscera by the gamma radiation without injuring the overlying skin in any way.

Radium has an extraordinary property in its ability to give off a gas or emanation which can be readily collected. This emanation has the same therapeutic virtues as the parent salt. Radium will give off this gas continuously throughout a lifetime and remain practically unchanged at the expiration of that interval. If the emanation is to be used as the therapeutic agent, one of the soluble salts is employed. Under these conditions, a large quantity of radium is needed. An expensive plant to separate the gas must be installed, and a trained physicist engaged to supervise the work. In many clinics the emanation is used exclusively. It is put up in small capillary glass tubes, about $\frac{1}{2}''$ in length, and about the size of a cambric needle. A quantity of the gas capable of doing the work of many thousands of dollars worth of the salt may be

Case 3.—Superficial and deep naevus of lip (Capillary and cavernous), showing result of one superficial and one deep application of radium.

stored in each of these glass needles. The life of the emanation is only a few days, whereas radium itself is almost proof against the passage of time as we measure it, its half life being computed at 1,750 years.

Administration

Radium is usually applied topically. It may be buried in the tissues in the form of radium tubes or radium needles. It is sometimes given by inhalation of the emanation, or watery solutions of the soluble salts may be administered by the mouth. It has also been exhibited intravenously and solutions of the bromide or chloride

salts have been injected subcutaneously. The use of buried needles is rapidly gaining in favor. Approximately 2½% of the radiant energy is utilized by this method.

In general terms, it may be said that pathological tissues are more radiosensitive than the normal; because of this varying tolerance it is possible to change the type and character of the diseased cell or destroy it entirely, at the same time sparing the normal. The successful radium therapist must so gauge the exposure that these ends may be attained. Too light a dose means failure to obliterate the morbid process, too strong an exposure, damage or destruction to normal tissues.

The therapeutic uses of radium are many and varied. In the treatment of naevi it has proved of great service. The superficial capillary naevus may be treated by a 5 or 10 milligram plaque protected by a rubber finger cot, kept moving over the involved area for varying periods of time. The deep or cavernous naevi are treated by screened radium held away from the skin for a distance of ½ to 1 inch, or by tubes or needles buried subcutaneously. In chronic lupus erythematosus it is of proven value. In basal cell epithelioma of the face it has a wide range of application and is constantly gaining in favor; the cosmetic effect is better than by any other remedy. In leucoplakia it ordinarily clears up the lesions promptly. In deep seated and more virulent malignancies it may be used as an adjunct to surgery. It has a distinct place as a palliative measure in inoperable malignancies, usually relieving pain, lessening discharges, making the patient more comfortable, and prolonging life.

In sarcoma, Hodgkin's disease and lymphosarcoma, it is the remedy of choice.

The following photographs illustrate the effects of radium treatment. Case 1—Mrs. P.—; lupus erythematosus of many years' duration, topical applications of radium. No recurrence after nine months.

Case 2—Mr. M.—Referred by Dr. Ross, Selkirk—rodent ulcer of 15 years' duration; clinical diagnosis confirmed by biopsy, made by Dr. Nicholson. A 12½ milligram needle was buried under each of the lesions and left in position for 5 hours. Four months later, the skin was entirely healed; free from recurrence after nine months.

Case 3—Baby F.—Cavernous naevus of the lip; excised surgically once, needled four times, recurrence. The bulk of the tumor was on the inner aspect of the lip, extending from the gum margin to the free border of the lip. Case referred by Dr. J. D. McEachern, Winnipeg. We decided to try radium and on March 12, 1921, under ether anaesthesia, we introduced two 12½ milligram needles, one on either side of the mass. These were left in position for 7¾ hours; on May 25th, a 10 milligram plaque was applied for half an hour to the skin surface. Recurrence of the deformity will not take place for radium damages the delicate endovascular endothelium and obliterates the vessels. It is a very gratifying result

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On Saline Purgatives.—Pharmacologists have repeatedly pointed out in connection with the use of saline evacuants that probably moderately dilute solutions would be more serviceable than the concentrated ones commonly used. The latter are preferred because of the lessened time required to drink a disagreeably bitter dose; but unless the removal of an excess of water from the tissues is one of the ends sought, such laxatives should always be subsequently diluted by an adequate water intake. Hatcher and Wilbert have pointed out that one especial advantage which natural mineral waters have over the solutions of purgative salts, as usually employed, is that they are very dilute, and the patient is thus required to consume a fairly large amount of water with them. This advantage can be secured so easily, however, by attention to the proper dilution of purgative salts that it is not sufficient to justify the expense of the natural waters.—*Jour. A. M. A.*, June 24th, 1922.

EMBOLISM OF THE ABDOMINAL AORTA*

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EMBOLISM of the abdominal aorta has been discussed by various writers, and it is generally agreed that chronic endocarditis with a resultant mitral stenosis is most frequently the cause of this accident. In such a diseased condition of the heart, with narrowing of the mitral orifice, partial stasis and production of eddies in the blood current, the formation of mural thrombi on the more or less diseased endocardium of the left auricle is facilitated. These thrombi may be flat or polypoid. A portion of a thrombus may become detached in the auricle and by the deposition of blood platelets, fibrin and leucocytes lead to the formation of a ball thrombus, varying in size from a hazel nut to a hen's egg.

It is easy to understand that a portion of either a ball thrombus or a mural thrombus may become detached, and passing into the ventricle through the mitral valve, be carried on through the aorta with the blood stream to become arrested (according to the size of the embolus) in a larger or smaller vessel. They are usually arrested at a bifurcation. That embolism of a comparatively large artery from this source is not more frequent is probably due to the narrowing of the mitral orifice in mitral stenosis, thus preventing a clot of a larger size passing through.

Another source of embolism of the abdominal aorta is acute ulcerative endocarditis, with the formation of vegetations on the valves, chordæ tendinæ, and papillary muscles. A portion of a vegetation may be broken off and pass into the blood stream until arrested, or a portion of a valve or even a papillary muscle may be carried away through ulceration. Among other conditions liable to cause this accident may be mentioned thrombosis of the aorta secondary to a diseased condition of the intima, aortic aneurysm, and the other rarer condition, thrombosis of the pulmonary veins. The common site for the arrest of an embolus in the abdominal aorta is at a bifurcation. It may become a riding embolus, *i. e.* a portion of it extending into both common iliacs causing complete or partial obstruction of one or both of these vessels. Secondary or propagating thrombosis then occurs to some extent upwards, but more extensively downwards, in the occluded or partly occluded vessels.

The onset is usually sudden and attended by extreme pain in the abdomen and lower extremities, and if the obstruction is complete, pulsation in the vessels below the occlusions cannot be felt; the limb becomes cold and bloodless, there is loss of sensation, and gangrene results. The sudden onset of severe pain in the abdomen and lower extremities, anæmia of the limbs with loss of sensation, absent pulsation in the vessels if the occlusion is complete, points to an obstruction of a large vessel. When this is associated with mitral or aortic disease (especially where there is a previous history of rheumatic fever) embolism is more probable than thrombosis. In recent cases of aortic embolism transperitoneal aortotomie with extraction of the embolus after the method of Wahl is recommended by Hesse and it would seem to be the rational method of treating this very fatal condition. Hesse quotes three cases so treated, one of which lived twenty hours, one three days, and one two and a half years.

Welch published in Allbutt's "System of medicine" in 1899 an analysis of 59 cases of embolism and thrombosis of the abdominal aorta. His conclusions showed that in 54 cases the plug occupied the lower end of the aorta and extended a variable distance into the arteries below. Forty-five of the cases were referable to embolism of the bifurcation of the aorta and 14 due to thrombosis; mitral stenosis existed in 20 cases; acute mitral endocarditis in 3; mitral endocarditis in 4; mitral insufficiency without stenosis in 1; thrombi in the left ventricle (mostly without valvular disease) in 8, and large aortic vegetations in 1.

Hesse made further contributions to the literature on the subject by producing in 1921 in "*Archiv für klinische Chirurgie*" an article on embolism and thrombosis of the abdominal aorta. His researches indicated that he had collected 73 cases (including 41 previously mentioned by

*Read at the fifty-second annual meeting of the Canadian Medical Association, Halifax, July, 1921, but since then has been re-written and enlarged.

Meynard, Roussel, Heiligenthal and Welch), and had added 32 new cases. I am here reporting 2 cases of embolism, and still another case has been reported by Symes-Thompson in the *Lancet*, February 14th, 1914. The cases of embolism and thrombosis thus collected from all sources make a total of 94. An analysis of these cases shows that embolism is the more common condition, occurring in the proportion of about three to one.

Case 1.—I am indebted to Dr. F. G. Finley, Attending Physician to the Montreal General Hospital for permission to report the following case which is a typical illustration of the condition.

M. G. H., Case report No. 265-20;—Mrs. X., aged 48 years, was taken ill on December 31st, 1919, complaining of a fulness of the chest and swelling and pulsation of the neck. During the following week she seemed to be improving, but on January 12th, 1920, twelve days later, she suddenly developed agonizing pain in the right groin, back and down both lower limbs. During the next three days the pain in the left leg improved, but the right continued very painful, becoming gangrenous on January 15th, and she was admitted to the Montreal General Hospital on January 18th.

Personal History.—Twenty years previous to the present illness the patient had an attack of acute rheumatic fever when she was confined to bed for three months. Every succeeding two or three years she gave a history of heart trouble with symptoms of failing compensation which necessitated confinement to bed. One year previous to her last illness she had an operation for acute appendicitis, and made an uneventful recovery. For about two months previous to this last illness she had almost daily attacks of shortness of breath and faintness.

"On admission to hospital on January 18th patient was found to be suffering very great pain in right groin and both lower limbs, requiring frequent doses of morphine to control it. Breathing was laboured; temperature 100.2 ; respiration 22, pulse 114; eyes were closed, pupils reacted to light and accommodation; the teeth were poor, the tongue was coated, the mucous membranes pale; the lungs were apparently clear; the heart dulness was increased, extending 16½ cm. to the left from the mid-sternal line. There was a marked thrill; the sounds were forcible and there was a presystolic murmur at the apex. Pulse was very irregular. The abdomen was slightly tense, more so on the right side, no mass could be felt. Right leg was gangrenous from about midway between the knee and the foot; sensation was diminished as the line of demarcation was approached, below this it was absent. There was great pain just above the line of demarcation. On the left leg no patellar reflex could be elicited; sensation was definitely diminished below the knee, and the patient could not tell whether a blunt instrument or a pin was used."

The condition was diagnosed as partial obstruction of both common iliacs, most marked on the right side. On January 21st, nine days after the initial signs of obstruction, under spinal anæsthesia, the right leg was amputated by the circular method, about one hand's breadth above the knee. At first there was no flow of blood from the femoral artery, but after a few seconds a thrombus was expelled and this was followed by a gush of blood. Patient improved after the amputation and the temperature and pulse dropped. Morphine was frequently needed to ease the pain. The wound did not heal. On February 12th the patient had two attacks of severe pain in both lower limbs, requiring morphine. At this time there was sensation of pins and needles in both legs and the pulse could not be felt in the femoral or other vessels of the left leg. There was progressive weakness with evidence of a terminal pneumonia; the patient died on March 6th.

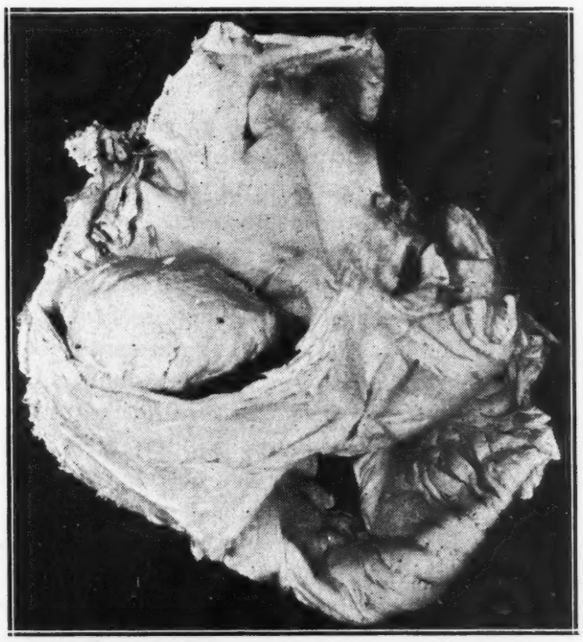
Autopsy.—Amputation of right lower limb through lower third of thigh, recent; emaciation; mitral stenosis; mural thrombosis left auricle; hypertrophy and dilatation of left auricle; passive congestion of pulmonary area; in right hilus a small patch of pneumonia; a propagating thrombus from cœliac axis above (partial) to iliac branches below; no canalization; extensive infarction of kidneys; infarction of spleen; no growth from specimen of heart blood.

In this case a portion of the mural thrombus in the left auricle had evidently become detached and passing through the mitral and aortic orifices into the aorta had been arrested at its bifurcation. A part of the embolus extended into each common iliac and caused complete obstruction in the right leg and partial obstruction in the left. A portion of the embolus in the right common iliac had broken off, passed down into the right femoral, obstructing it, and leading to gangrene of the leg which necessitated amputation.

Case 2.—Another case practically identical with the one above mentioned occurred at the Montreal General Hospital in the year 1890 in the service

of the late Dr. James Bell, Attending Surgeon to that institu ion. The autopsy was performed by the late Dr. Wyatt Johnston, Pathologist at that time to the same institution, and the specimen obtained was placed in the Pathological Museum of McGill University. I am indebted to Dr. Maude Abbott, Curator of the Museum for the details and illustrations of this case.

M. G. H. Surgical Case Book F XV, p. 109:—Mrs. Y., aged 44 years, was taken ill suddenly on



CASE II A—14.2420—**Large ball-thrombus blocking auriculo-ventricular orifice in mitral stenosis. Remains of mural thrombus in left auricular appendix.**

From a specimen in the Pathological Museum of McGill University, presented by Drs. James Bell and Wyatt Johnston.

February 25th, 1890, after a fit of anger, complaining of loss of power in both lower limbs which became numb, cold and paralyzed. The right limb soon recovered power but the left was tender, very painful and gangrene rapidly developed. She was admitted to the Montreal General Hospital on March 3rd, 1890.

Personal History.—There was a history of alcoholism; of rheumatic fever thirteen years previously, and of several attacks of tonsilitis. There had been repeated attacks of cardiac weakness with loss of compensation for the last eighteen or twenty years.

Condition on Admission.—There was hoarseness and a sense of uneasiness about the chest. The right leg was cold and pulse could not be felt in the popliteal artery. Sensation was normal; there was no discolouration. The left leg was tender, very painful and gangrenous. A line of demarcation had formed above the left knee. The radial pulse was rapid, weak and irregular. The patient died on March 9th with agonizing pain in the left leg.

CASE II B

Autopsy.—Chronic mitral endocarditis and stenosis; dilatation and thrombosis of left auricle; secondary embolism and propagating thrombus of left external iliac and femoral arteries; gangrene of left foot and leg; acute synovitis of left knee; nutmeg liver; induration of the lung; hæmorrhagic infarcts; embolism of kidney.

The source of the embolism was seen to be a large globular ball thrombus which lay in the left auricle occluding a stenosed valve. (See Illustrations Case 2, A, and Case 2, B). This ball thrombus had evidently broken free sometime previously from a thrombus mass in the left auricular appendix, fragments of which still remained attached *in situ*.

SHOULD THE SANATORIUM LABORATORY DO COMPLEMENT FIXATION AND OTHER SERUM TESTS AS ROUTINE MEASURES*

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So that you may from the outset prepare your criticism my answer is in the affirmative. I feel however, that no paper on this question, nor the citation of examples, which I am now in a position to give in hundreds, will convince you. Even the routine application of serological data in the examinations of your cases may not, *if* you expect to interpret the results in tuberculosis as you have been accustomed to do in syphilis.

In syphilology, the introduction of the spirocheta means syphilis: there may be delayed or irregular appearances of the different stages, but in practically one hundred per cent. syphilis follows. There is no term, clinical syphilis, as we apply that adjective clinical in tuberculosis.

In tuberculosis, in contrast to syphilis, the introduction or implantation of the tubercle bacillus means, a little less than 100% freedom from the *disease* of tuberculosis: to be more exact one per cent. active disease, one per cent. quiescent or inactive (Framingham reports 1); doubled let us say, because not all are exposed, and we have 96% freedom from *disease*. As a rider to this in tuberculosis we accept the belief that implantation means 100% tuberculous *infection*.

Now a serological test such as a positive complement fixation never necessarily means disease but it always does mean a biological response on the part of the host to some antigen, whether introduced from without or within (exogenous or endogenous). If you inject foreign proteins you will obtain complement fixation to those proteins used as antigens. In syphilis it has been found that a very large percentage of cases give complement fixation *i.e.* the Wassermann reaction to certain antigens. Consequently we infer the presence of the disease and on this basis make the diagnosis.

By injecting extracts of, or killed tubercle bacilli, we obtain complement fixation with those bodies and the serum of the injected animal. But this does not mean that the host has tuberculosis—it cannot; but it does mean that the host has reacted to certain integral portions of the injected bacilli. May I here re-present the contrast between tuberculosis and syphilis in that the implantation of the bacillus rarely (in terms of percentage) means the production of what we call clinical tuberculosis. The inference is, I think, obvious; the positive tuberculo complement fixation result never necessarily means the clinical disease, and must be interpreted in a different manner than is our custom with the Wassermann results in syphilis.

Before I suggest the manner—as I see it—of interpretation in tuberculo-serology, let me refer you to a chart published by Opie and Anderson. (2) From this I will attempt to persuade you to the view that at any rate we need further diagnostic methods.

CHART I

X-Ray of lungs at post-mortem	No. of Autopsies	Conjectured clin. tbc
No calcified lesion	7	?
Positive lesion group 1.	28	X
" " " 2.	41	X +
" " " 3.	7	X +++
" " " 4.	3	X ++++
Total	86	

(After Opie and Anderson: the conjectured clinical tuberculosis column has been added).

Chart 1. illustrates the lesions of pulmonary tuberculosis as portrayed by X-Ray plates taken at post-mortem of cases dying from all causes other than tuberculosis. The different groupings from 1 to 4 represent increasing degrees of involvement. While defined by Opie in his paper, it is I think, sufficient for our purposes to state that the amount of involvement found in group 4 was very considerable.

*Read before the meeting held by the Department of Soldiers' Civil Re-establishment, March 13-16, 1922, for consideration of problems incidental to tuberculous and non-tuberculous pulmonary diseases.

(Referring to Chart 1.) For any given number of people, one can surmise that by the time the anatomical involvement has reached the extent designated in group 1, a certain number of cases of clinical tuberculosis will have developed: further, that the percentage of clinical tuberculosis from this group on will be in inverse proportion to the decreasing percentage of what one may call spontaneous arrests as depicted in groups 2, 3 and 4. As the wave of anatomical involvement increases, fewer proportional instances are found of arrested lesions, and one can believe from our clinical experience that the number of cases showing clinical manifestations of the disease increases. To convey this idea graphically in chart 1, I have used the sign ? as indicative of the conjectural number of cases of clinical tuberculosis which might develop withal preceding demonstrable calcification: the letter x together with plus (+) signs to indicate that the ratio between spontaneous arrests or cures and clinical tuberculous involvement is in inverse proportion.

Opie and Anderson make the following observations,—"In many instances the X-Ray plate demonstrates that the individual has suffered with tuberculosis which would have been recognizable at some time during life had suitable diagnostic measures been employed." They further state that, "the distinction between latent and clinical tuberculosis———has no other basis than the limitations of diagnostic methods and the tendency of tuberculosis to recovery."

It is to be remembered that these X-Ray pictures obtained at post-mortem represent the aggregated results of the activities of the tubercle throughout the life of the individual, and that the entire anatomical involvement may have been achieved, at one period or at interrupted periods of time. During these periods —non clinical remember—positive serological data are as likely, (possibly more likely) to be obtained as throughout the course of the clinical disease. If such immunological data do indicate bacillary activity we have the means of introducing preventive medicine in the field of tuberculosis.

The pathological involvement as depicted in groups 1 and 2, would not with certainty be diagnosed by stereo plates taken during life, and further we know that clinical disease will on rare occasions be brought to the attention of the first physician consulted only after the anatomical involvement far exceeds that of group 4.

My contrast with the Wassermann reaction is finished in furnishing you with possible interpretations of serological data as regards tuberculosis by these deductions drawn from the prevalence of tuberculous lesions as found at post-mortem.

I have spent a great deal of the short time at my disposal in presenting the view, that results in tuberculo-serology show specific reactions on the part of the host to tuberculous products, and that this data must be incorporated with that afforded by other methods of investigation (clinical and radiological) in the formation of one's final opinion. The serological data must be interpreted through its own etiological considerations. I would ask you if our clinical or radiological data is without etiological modifications? You would not dispense with the X-Ray to-day although there are many practitioners in medicine who, still without personal experience of the stereogram of the chest and dependent upon the radiologist's reports, doubt its great practical value.

My further remarks will deal with both the inhibitive and tuberculo-complement fixation reactions. Despite the fact that no laboratory but my own has published data regarding the former I feel it is futile to discuss the value of fixation when both are available—as futile as it is to discuss the value of the flat as against the stereo plate. This conviction is strengthened by the conversion of my four clinical colleagues, the majority of whom began with distinctly antagonistic attitudes regarding the practical value of the t.c.f. reaction by itself.

I believe the proof of any interpretation of serological results in tuberculosis will lie in the continuous application of the tests for long periods of time on large groups of suspected and positive tuberculous, and on clinical normals,

Before presenting some of the more marked percentage results obtained amongst such groups, it seems necessary to outline in rather dogmatic fashion the following collective and condensed interpretations which we at the Toronto clinic apply to our serological data.

Regarding the inhibitive reaction it can be said that:

(1) A 1st or 2nd class result indicates at the time an activity of some type on the part of the bacillus, to which the host is reacting favourably.

(2) A 3rd class or negative result is found:

(a) in normals at the moment free from this type of activity.

(b) in many cases of tuberculosis at the time not doing well; to split hairs, suffering from those types of activity to which the host does not respond favourably.

(c) certain cases of tuberculosis probably doing well without that type of activity to which biological response is necessary.

There is thus a varied interpretation possible with the inhibitive reaction results. While they bear little relationship to the extent of the pathological lesion but do to the degree or type of activity as regards clinical progress, the dual interpretation with the 3rd class and negative should be stressed.

Regarding the tuberculo-complement fixation it can be said:

(1) Not all cases of clinical tuberculosis give a positive result.

(2) A percentage of all stages and types (anatomical and clinical) give it in varying degrees from a doubtful to a so called four plus reaction.

(3) Once the reaction is firmly established it is liable to remain for a considerable period of time: In this respect it is in marked contrast to the tendency of the inhibitive reaction to change.

The results of both tests tend to supplement each other when considered with previous (serological and clinical) data and the present clinical aspects of the case.

The application in diagnosis is different from that in definite cases of the disease.

In diagnosis positive serological results are to be interpreted as meaning response by the patient to tuberculo-products; it is for you as clinicians to correlate this information with other data in deciding whether the case is one of clinical tuberculosis, or should perhaps be kept under observation, even some restrictions of activity. Do you not interpret suspicious radiographic findings differently in different cases,—depending upon the clinical aspects. Use to an extent the same methods with your serological data.

In definite clinical cases variations in serological results indicate responses on the part of the patient to activities of either the bacillus or the lesion. The results in consideration with past data may suggest nothing, may merely confirm your tentative conclusions, or may give strong indication of relapse or subsidence which can be translated into practical changes in treatment.

One more point I can not too strongly urge. Do not expect to obtain distinctive serological findings under the clinical classifications with regard to volume of disease such as incipient, moderately advanced, or far advanced. They are etiologically not adapted to this type of standardization. They are immunological guides in the routine examination and handling of your cases. Follow your cases with routine serological data and I feel sure you will be convinced. For this a serological laboratory should be on the premises; forwarding sera out of town is not satisfactory.

CHART II

126 combined serological tests carried out on 65 students since February '21 (Wassermann negative in all) Stereograms taken in all.

		Per Case.	Per Test.
t.c.f. reaction	persist. neg.	38 cases 58%	74 tests 59%
	persist. weak pos.	11 cases 18%	
	variation between neg. and weak pos.	14 cases 22%	
	persist pos.	5 cases 7%	11 tests (3 cases strong pos. always) 9%
inhibitive reaction	persist. neg. or 3rd class	61 cases 94%	122 tests 97%
	2nd or 1st class once	4 cases 6%	4 tests (2 cases tested only once 3%
	repetition of 2nd or 1st class	0 cases 0%	
combined	2nd or 1st class and pos. t.c.f.	0 cases 0%	
	Tuberculin sensitiveness	persistently negative	25 cases 38%
		positive	45 cases (5 cases or 7% negative to 1st test) 62%

Cases found absolutely negative to 1-20 mg. O.T., the amount which has been used intracutaneously, were given on their next appearance 1-2 mg. intracutaneously. It was in this manner that the five cases were found to be positive on the 2nd test.

Before referring to the percentage results depicted in charts 2, 3 and 4, I would like to comment on what may be termed the positive findings of the serological data,* that is weak and strongly positive t.c.f., and 1st or 2nd class inhibitive reactions with regard to their specific or to their accidental character. I feel they are to be regarded:

(1) as the result of activity within the tuberculous lesion, or

*The t.c.f. results have for our present purposes been divided into (1) negative, (2) the doubtful or weaker degrees of fixation, and (3) the positive, and strongly positive: The inhibitive reaction into (1) negative and 3rd class and (2) 2nd and 1st class results.

(2) as due to experimental error.

The grounds of experimental error are;

(a) False reading of the test tube result or,

(b) because of some non-specific factor in the serum tested.

any degree of fixation is the most marked comparative feature. This is emphasized by the fact that only 38% of the parenchymatous group give the stronger degree of fixation, and because of the very limited value of any weak fixation in

CHART III

		Normal 65	20% Non Tbc. (80)	400 routine cases 24% Parch. (X-Ray) Tbc. (98)	38% Inhib. 1st or 2nd
Inhibitive reaction	1st or 2nd class	(4) 6%	(6) 7%	(50) 51%	(152) 38%
	Repeated 1st or 2nd	0%	1%	54%	20%
Combined reaction	1st or 2nd with pos. t.c.f.	0%	3%		47%
t.c.f. reaction	Strongly pos.	7%	2%	38%	15%
	Strongly pos. but not always			24%	
	Any degree persistently absent	58%	50%	18%	

Before deciding that these positive results obtained in normals are entirely due to experimental error and bear no etiological relationship to a recent or present tuberculous lesion, one must completely discount the results of Opie and Anderson, of Griffith (3), and others.

Chart 2 shows the results obtained in one group of normals. It is intended to follow these students throughout their five years at the University. Already a number of interesting possibilities have presented themselves which are however better appreciated when more elaborately charted.

The most practical features are:

1. The comparative few which have been persistently negative with the t.c.f. test, showing that with the weaker grades of this reaction diagnostic interpretations must be made with the greatest reservation.

2. The small percentage of positive results with either strong fixation or 1st and 2nd class inhibitive results.

3. The entire absence of either repeated positive inhibitive (2nd or 1st) results or the combined results of both tests.

Chart 3,* is fairly self explanatory and shows the contrast of the results obtained with the different groups selected. The diagnostic value of a 1st or 2nd class (*i.e.* positive) inhibitive reaction, when repeated or when combined with

*The data in charts 3 and 4, have been obtained from summaries which are being compiled of the histories at the Department of Soldiers' Civil Re-establishment Chest Clinic, Toronto. A full analysis of these will be published as soon as possible.

diagnosis. Including all degrees of fixation 82% were positive in the parenchymatous group, but the majority of these results were of the weaker type, which for diagnostic purposes must be considered in relationship with the frequency of weak fixation in the normal group.

CHART IV

98 Parch. (X-Ray) 24.5%

Min. 56 (57%)
Mod. Adv. 34 (35%)
Far Adv. 8 (8%)

Inhibitive
3rd or neg. . . 48 (49%)

1st or 2nd . . . 50 (51%)
Repeated . . . 15
with pos.t.c.f. 22 } 27 (54%)
(weak t.c.f. . 18)

Average test per patient . . . 2.2
Maximum " " " . . . 7.0

Correlation
Undecided 12
Apparent fulfilment 31
" " + ... 5
Undecided 3
Apparent fulfilment 31
" " + ... 16

In chart 4, a contrast is afforded of the greater prognostic value of the 'positive' inhibitive to the 3rd class and negative results. In the questionnaire which we are using correlation between the serological data (as we interpret it) and the course of the disease is summarised as 'undecided', as 'apparent failure' and as 'apparent fulfilment'. Fulfilment when of leading significance in the case is stressed by the sign +. The percentages obtained in this regard are given in chart 4. Because these cases are all parenchymatous positive it is difficult to label any as affording evidence of failure except for example in those instances where an exacerbation can not be detected clinically when a positive inhibitive

result has followed previously obtained negative results in an arrested or cured case. These instances are likely to be labelled as undecided. A series of negative serological results are very unlikely in any 'doubtful' case which does not in this course of time develop demonstrable pathological lesions. Consequently such results will often support an exclusion of tuberculosis or maintain the completely arrested character of the lesion.

A few of the chief features in the 152 case group (*i. e.* 1st or 2nd class inhibitive results, chart 3), have been worked out and are as follows. Frank tuberculosis was finally diagnosed in 113 or 74% of the cases: previously tuberculous in 7 or 4%: possibly tuberculous (diagnosis doubtful) 23 or 15%: non tuberculous 8 or 5%.

In the 113 cases of frank tuberculosis 54 or 48% gave positive X-Ray evidence of a parenchymatous lesion: the extent of this being minimal 27, moderately advanced 18, far advanced 3. Four cases of the 113 were not X-Ray but had positive sputum.

In the 152 cases the correlation between the course of the disease and the serological findings were as follows:—Apparent failure 12 or 8%, meaning thereby that the suggestion afforded by the serological results were not verified clinically: undecided 26 or 17%: apparent fulfilment 88 or 59%: and fulfilment of extreme clinical value 26 or 17%. The two subdivisions of fulfilment total 76%. An individual analysis of the apparent failures, or the citation of examples in which the serological data correlated with or prognosed the clinical course, is beyond the scope of this paper. The value in general is I hope exemplified in the different percentages obtained by the analyses.

1.—Armstrong, D. B. Four years of the Framingham demonstration. *Am. Rev. Tuberculosis*, 4, 12, p. 908 (February) 1921.

2.—Opie, E. L., and Andersen, Hans. First infection with tuberculosis by way of the lungs. *Am. Rev. Tuberculosis*, 5, 8, p. 670 (October), 1921.

3.—Griffith, A. S. An enquiry, based on a series of autopsies, into the occurrence and distribution of tuberculous infection in children, and its relation to the bovine and the human types of tubercle bacilli respectively.

Reports to the Local Government Board of Public Health and Medical Subjects. H.M. Stationery Office, New Series No. 88,1914.

The Alleged Insusceptibility to Intoxication by Poison Ivy.—With the advent of the season when rhus dermatitis, following contact with poison ivy, becomes common, a recrudescence of the myths regarding the effects of this plant is certain to ensue. The failure of many persons to exhibit symptoms following apparent exposure to toxic species of rhus has presumably been responsible for the widespread belief that some individuals are not susceptible to the poison. An investigation by Brown in the Department of Pharmacology at the University of Minnesota justifies the conclusion that there is probably a personal variability in susceptibility depending on temperature, condition of the skin, and many other factors which are not yet understood; 2 but he is also convinced that there is no conclusive evidence of such a state in man as entire insusceptibility to the poison. Contrary to the theory of "desensitization" by internal administration of tincture of rhus, it appears that the susceptibility may be increased with successive intoxications.—*Jour. Am. Med. Association.*

Toxic Protein End-Products: The Cause of So-Called Inanition Fever.—De Witt H. Sherman and Harry R. Lohnes, Buffalo, claim that the cause of inanition fever is the toxic protein end-products, developed in the intestinal canal. The development of these toxins is due to the lack of ingestion of the carbohydrates dextrin and lactose, which produce an aciduric state, a soil unfavourable to the development of proteolysis, in other words, a soil unfavourable to the development of toxic protein end-products. These fevers are due to proteolytic toxins, and can be easily forestalled by the early administration of the carbohydrates dextrins and lactose. These are food elements which favour the production of innocuous aciduric flora, which in turn inhibit the multiplication of the proteolytic flora, and thereby prevent the formation of toxic protein end-products. The authors suggest that the vague term "inanition fever" be discarded, and the "proteolytic intestinal toxemia of the newborn" be used in its place.—*Jour. Am. Med Association.*

MESENTERIC THROMBOSIS—WITH REPORT OF TWO CASES*

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DURING the last few years a number of articles on the subject of occlusion of the mesenteric vessels have appeared in the literature with reports of numerous cases; the result is that a condition which was once believed to be of rare occurrence is now coming to be regarded as somewhat common, and as something which possibly goes often unrecognized. Some few months ago the writer had within a month two cases of thrombosis one of the inferior mesenteric artery and the other of the superior mesenteric vein; these required surgical intervention, each being admitted as an emergency case to the Toronto General Hospital. As these cases were of considerable interest they are deemed worthy of being presented to this section with a short discussion of the subject.

1st case—Mr. R. G.,—Case No. 50369—Thrombosis of the inferior mesenteric artery. Admitted June 10th, 1921. Discharged August 5th, 1921. Male, age 62. Occupation, boxmaker.

Complaint—Severe abdominal pain of fifteen hours duration.

Previous illnesses—None of importance. Personal and family history—negative. Weight 135 pounds.

Present Illness—Was well early in the morning but was seized with severe abdominal pain shortly after going to work. Pain was sharp and felt generally over the lower portion of the abdomen, and growing worse obliged him to go home to bed. He took castor oil at 8.30 a.m. and a dose of salts at 10.00 a.m., after which he became nauseated and vomited. Later he took another dose of salts, and as the pain became more intense than ever he called a physician, who gave him an enæma. As he had no relief he decided to come to the hospital about midnight.

On admission, he was able to lie on his back but complained bitterly of abdominal pain, and was not able to describe his subjective symptoms.

Examination—Heart not enlarged, systolic murmur present at apex. Arteries markedly sclerosed, and pulse 110 of low tension—Blood pressure 100 systolic, 60 diastolic. Temperature 98.5°. There was a marked purple discoloration of the whole abdomen and of the thighs to the knees. Abdomen—somewhat distended—no respiratory movements and no peristalsis visible. Tender all over but apparently most tender in left lower quadrant. No areas of cutaneous hyperalgæsia. Bilateral boardlike rigidity. Bladder empty. Liver dullness present—no signs of shifting dullness—no mass palpable, but a greater tenseness of the abdomen was felt in the left lower quadrant. Rectal examination—negative.

Catheter specimen of urine, acid, no albumin, no sugar, no indican, S.G. 1012. Microscopic examination—negative. Blood—white blood cells 21,000.

Diagnosis.—The patient was evidently profoundly shocked and suffering from an acute intraabdominal lesion. Volvulus of the sigmoid or mesenteric thrombosis were considered the most probable conditions in the differential diagnosis.

Operation.—Laparatomy at 3.00 a.m. about eighteen hours after onset. Midline incision. Distended coils of intestine with roughened serosa presented. Below this was a large coil of colon, very dark in colour, distended with gas. This gangrenous portion commenced in the descending colon and extended to the junction of the sigmoid and rectum. Above and below this section the bowel was healthy. The gangrenous portion was delivered en masse. An incision was made into the coil and contents emptied. The gangrenous bowel and its mesentery were excised and the root of the mesentery oversewn. The divided proximal end of the descending colon was brought out through a stab wound in the left flank and sewn to the skin with a Paul's tube inserted and ligated in place. The upper end of the rectum was sutured to the surface at the lower end of the incision which

*Read before Section of Surgery, Academy of Medicine, Toronto, Feb 21st, 1922,

was closed with through and through silk worm gut sutures.

Post operative course was complicated by broncho-pneumonia but patient was able to be out of bed in two weeks.

Pathological Report—Material.—Sigmoid colon and mesentery, bluish in colour. Marked necrosis. One artery in the mesentery showed an area of thrombosis, the artery being quite full of whitish yellow translucent material which cut with some resistance and around this area was a red blood clot. Microscopic examination—showed thrombosis of the mesenteric artery with gangrene of the bowel.

2nd Case—Mrs. K. N., Case 50370—Thrombosis of superior mesenteric vein. Admitted July 10th, 1921, died July 11th, 1921. Female, age 40, married.

Complaint on admission (1) constipation, chronic 20 years. (2) constipation, acute, 2 days. (3) pain in abdomen, 3 days.

Previous Illnesses and Family History—Negative.

Present Illness.—Patient has had chronic constipation for the past 20 years, and was taken ill 7 days ago with a more acute type of constipation, necessitating the aid of a physician. Her last bowel movement occurred two days ago (July 8th) by aid of castor oil and enema, when some large hard tar-like lumps of fæces came away. On July 10th in the afternoon, patient was seized with severe abdominal pain, first in the left lower quadrant of the abdomen, but later the pain became generalized extending above the umbilicus. The pain was sharp and very distressing; continuous and quite unrelated to meals. It did not radiate. Patient belched gas, an old symptom now exaggerated. Patient vomited three or four times, a yellowish green fluid. These symptoms not abating, her physician sent her in as acute obstruction.

Physical Examination.—Patient lies flat on back and seems to be in considerable pain. Answers questions well and does not seem to be shocked. Complains of pain in the epigastrium, localizing it vaguely. There appears to be a yellowish tint of jaundice on the face but not on the conjunctivæ.

Abdomen.—Symmetrical, rounded. Very slight movement on respiration. No distension. Palpation-no mass felt. There was slight abdominal rigidity, which was more marked above the umbilicus, equal on both sides. No tender localized area. Percussion—negative. Cardio Vascular—pulse 68. Heart sounds normal. Blood pressure—138 systolic 60 diastolic. Reflexes—knee jerks absent. Pupils react normally. Patient belches a little gas. Temperature 101.

Diagnosis.—(1) The jaundice, belching of gas, chronic constipation, suggested disease of biliary tract. (2) The tarry stools suggested ulcer, mesenteric thrombosis or enteritis.

Tentative Diagnosis.—Lesion of upper gastro-intestinal tract.

Operation.—Abdomen opened in right rectus above umbilicus. Biliary system apparently normal. Large scyballous masses as big as walnuts in colon. A loop about nine inches long of the jejunum was found the colour of a blood sausage with marked œdema but glistening serosa. The lumen of this loop was obstructed by the œdema. Gangrene had not yet developed. This loop of gut was excised and an anastomosis was made. A wedge-shaped resection of the mesentery attached to the excised gut was made, revealing a large number of venous thrombi. Abdomen closed with drain. Patient received an interstitial saline injection. Pulse on return to ward was 128 and of fair quality. Morphia given. Pulse became soft rate 130. Pituitrin given and camphor. Enema relieved distension. Patient became restless, pulse rose and later became imperceptible. Patient had received 110 ounces of saline by the intersitial method. She died about 24 hours after operation.

Autopsy Report.—Abdomen contained about a pint of reddish fluid. A great part of the intestine was bluish, but the peritoneum had still its lustre. This discolouration of bowel commenced, at the site of the anastomosis and extended down to within 12 inches of the ileo-cæcal valve. Appendix and gall bladder were free of disease. On tracing the vessels of the abdominal cavity an ante-mortem thrombosis was found to exist at the junction of the splenic and superior mesenteric veins. This extended along the splenic vein almost to the spleen, on in to the portal vein as far as the liver, and down the superior mesenteric vein, running into its tributaries to all the coils of the small intestine. The thrombosis had apparently started in the splenic vein above the junction of the superior mesenteric vein and the splenic and was probably due to inflammation in the pancreas. The tail of the pancreas and hilus of the spleen were matted together. This mass was in close proximity to the end of the thrombosis near the spleen.

Liver.—On section thrombosis was found to extend up into the vessels inside the liver. The surface was somewhat yellowish with darker areas.

Spleen.—Large, considerable pulp on scraping.

Anatomical Diagnosis.—(1) Thrombosis of splenic veins, splenic-mesenteric veins and portal vein. (2) Pressure on junction of superior mesenteric vein and splenic vein by head of pancreas. (3) Mass, probably inflammatory in tail of pancreas involving spleen. (4) Nephrosis of both kidneys. (5) Endometritis. (6) Passive congestion at base of both lungs.

Microscopic findings.—Lungs—marked œdema—some areas of broncho-pneumonia. Heart—normal. Uterus — normal. Pancreas—vessels show antemortem thrombosis, part of pancreatic tissue degenerated, some increase of intralobular connective tissue, some lymphocytic infiltration (evidence of old inflammation). Spleen — normal. Kidney — some degeneration of proximal tubular epithelium—some passive congestion. Ovaries — normal. Suprarenals—normal. Liver—areas of degeneration of liver cords which are irregular in shape, nuclei do not stain and cytoplasm is light staining, some vessels thrombosed.

Etiology.—There are about 500 cases of occlusion of the mesenteric vessels recorded and of these about half are of arterial and half of venous origin. The arterial blood supply of the intestine is from four sources—the cœliac axis, the superior mesenteric, the inferior mesenteric and the middle and inferior hæmorrhoidal arteries. There is free anastomosis of the superior and inferior pancreatic-duodenal arteries and the middle and left colic arteries and the terminals of the inferior mesenteric artery and the middle hæmorrhoidal,

Experimental work on animals has shown that the collateral channels are incapable of supplying blood in sufficient volume to maintain life in the bowel if the superior or inferior mesenteric arteries are ligated. It must be admitted, however, that a few observations are on record where the anastomotic channels were sufficient to overcome the effect of ligation of one of these main arteries, though in the vast majority of cases intestinal infarction occurred. In the dog ligation of the superior mesenteric artery is followed by violent contractions of the intestine with anæmia which persists for two or three hours. This spasm is doubtless an important factor in the prevention of collateral circulation from the anastomotic channels.

In man the causes of obstruction of the mesenteric arteries are embolism, thrombosis secondary to sclerosis of the arterial wall, or a combination of the two.

Venous obstruction is more complicated and occurs almost invariably as thrombosis, though retrograde embolism has been described.

Thrombosis of the mesenteric vein may ascend from thrombosis of its radicals due to an inflammation of the appendix, the pelvic organs, or the anal region or it may descend from a thrombosis occurring in the liver, gall bladder or pancreas, as a result of inflammation.

Intravascular clotting may occur apart from sepsis and is apt to occur after operations in which veins are transfixed, as for example, in the suturing of the omentum. In addition to these more common causes there are many others recorded such as, thrombosis commencing in strangulated hernia, ulcers of the intestine, intussusception, abscess of mesenteric glands, breaking-down carcinoma, phlebitis of the lower extremities, prostatic abscesses, and cirrhœsis of the liver.

Symptoms.—The outstanding symptoms are (1) pain and tenderness (2) collapse (3) vomiting (4) bloody stools (5) distension (6) obstruction.

The most common symptom is pain which is sudden and severe and usually of a cramping character, the cramps succeeding each other with shorter and shorter intervals of relief. The pain at first may be localized but soon becomes general, and is accompanied by collapse. Vomiting at first reflex soon becomes continuous, through the development of obstruction. Soon after the onset the patient may pass several stools and in from 30-40% of cases the stools contain blood. This sign when present with the other symptoms renders the diagnosis almost certain. Within a few hours after onset abdominal distension becomes manifest most frequently with absolute obstruction and an acompanying peritonitis.

Examination of the patient will usually show general tenderness though in some cases it may be localized to the affected area. Palpation may enable one to feel a fixed coil of intestine but is not well tolerated by the patient on account of his pain and tenderness. Rigidity if present, is of the voluntary type unless peritonitis has already occurred.

Careful palpation of the abdomen on the operating table with the patient anæsthetised, should always be practised before the incision is made,

as it is then often possible to detect abnormalities that are quite impalpable with the patient conscious and his muscles on guard.

Diagnosis.—The association of these symptoms and signs with cardiac disease to account for arterial embolism, particularly mitral stenosis and malignant endocarditis, or vascular disease to account for arterial thrombosis—or their occurrence in a patient who has recently had an abdominal or pelvic inflammation or operation, should lead to an early diagnosis. Too much time should not be expended considering the diagnosis, for action is necessary if life is to be saved. What Roswell Park says about acute abdominal crises is particularly true here *viz.*, "In the presence of sudden acute symptoms which include intense abdominal pain, collapse and rigidity of the abdominal wall, very little time should be lost in speculation as to the cause of the lesion."

Prognosis.—The length of gut implicated is the primary consideration in giving a prognosis, the length of time since the onset and the condition of the patient are of less importance. Nine cases of spontaneous recovery of well authenticated cases of mesenteric thrombosis are on record and twenty-four successful resections have been recorded apart from the case described. The condition therefore has a mortality of approximately 93%.

Treatment.—All cases should be operated on as soon as possible—and the affected bowel either resected or simply delivered outside the abdominal wall. Shock should be combatted by the use of light gas-oxygen, combined with local anæsthesia, and rapid work. Interstitial infusion of saline supplies the dehydrated tissues and the use of warm applications to the abdomen conserves bodily heat, and protects the function of the liver. During the operation, if the intestine is markedly distended it may need to be emptied. Enough bowel must be removed to insure a sufficient blood supply to the remaining intestine. If resection of the upper part of the small intestine is required axial union is better than side to side.

Some Conditions Controlling Internal Secretion.—No one, says W. B. Cannon, Boston, may now question the great influence of the glands of internal secretion on important physiologic processes. There appears to be a tendency just now, however, to pay these glands not only respect, but also deference, homage and a blind worship. The physiologist regards the body as a system of organs, each performing its service, each influenced by other organs and capable in turn of influencing other organs, and each having a use and a value only in relation to the others. Questions now arise regarding the real status of the glands of internal secretion. If they have not the dominant position commonly assumed for them, how may they be subordinated? What influences can be brought to bear on them in such a way as to modify their activity? These are important questions to have answered—important because of the profound effects which the ductless glands themselves are capable of exerting. Cannon presents some of the evidence for physiologic control of the internal secretions. He points out that bodily functions are managed by a system of checks and balances—by mutual adjustments, such as those between antagonistic muscles, and by maintained equilibria, such as those between material income and outgo, and between acid and base in the blood. If the endocrine glands are regarded as the regulators of important physiologic processes, normally they are well regulated regulators.—*Jour. Am. Med. Association*, July 8th, 1922.

Calcium Lactophosphate in Cyclic Vomiting.—Green (Med. Record, January 14th, 1922) calls attention to the value of calcium lactophosphate in cyclic vomiting and severe migraine. Two cases are recorded, a boy of 7 and a girl of 8, who suffered from severe attacks of cyclic vomiting every two or three months. After a prolonged course of calcium lactophosphate, in 2-grain doses three times a day, no further attacks occurred for more than a year. In adults suffering from migraine, 5 grains three times a day taken over a considerable period have markedly relieved the symptoms, and its value is urged in those cases of periodic vomiting and severe migraine which resist all other attempts toward permanent relief.

Case Report

BILATERAL CARCINOMA OF BREAST

Drs. Webster and Hooper

Ottawa

Mrs. E. S., age 45, presented herself complaining of "lump" in breast. It was first noticed two years ago on sight of old abscess. Past few months became more noticeable, dull pain and ache. Family history negative. Past history generally healthy, married, has had children. Examination showed well nourished woman, looked older than age stated. Heart and lungs negative, abdomen neg., urinalysis neg., haemoglobin 80 per cent., R.B.C. 5,000,000. Hard mass size of an egg upper and inner quadrant left breast, skin retracted, mass slightly adherent to deep fascia, gland at border of pectoral muscle palpable; no other glands. Diagnosis of scirrhus carcinoma made and operation advised.

In course of routine examination a hard nodule, size of a walnut, moveable, was found upper and inner quadrant very near nipple, right breast, no glands palpable, clinically this was considered malignant.

Operation was done in a few days. Left breast, axillary contents and pectoral muscles removed from above down. Pathologic report showed "Chronic mastitis diffuse, with scirrhus carcinoma in one area. Glands not affected."

Patient made an uneventful post-operative recovery. Later on she returned and right breast, axillary contents and pectoral muscles

Second Catheter Pointing to Retro-Caecal Abscess

removed. Pathological report stated. "Some areas show marked fibrosis. One nodule shows a condition of fibro adenoma. There is a definite cystic change, in places contents chocolate coloured. In one place there is a papillomatous change in cyst, and I would regard it as early cancerous development."

At the present time she is receiving radium treatment as a follow up. Is in good health.

Myocarditis and its Management—The whole subject of treatment of myocarditis is condensed by William A. Jenkins, Louisville, Ky. (*Journal A. M. A.*, June 24th, 1922), as follows: (1) There are no specifics. (2) Drugs are secondary in importance to the other measures mentioned in this paper. (3) Much will depend on the physician managing the case, on his skill and ability to collect, summarize and properly evaluate all of the various and intricate factors entering into the case. If any benefit is obtained, it will be secured by working along these general lines: (*a*) all measures that will tend to make easy the work which the crippled heart has to do should be adopted. (*b*) Appropriate use should be made of all measures that will tend to combat, or retard, the progress of the degenerative changes. (*c*) The judicious use of remedies which will stimulate or act directly upon the cardiac muscle itself is demanded.—*Jour. Am. Med. Association*, June 24th, 1922.

Retrospect

ON TONSILLECTOMY; AND ITS AFTER EFFECTS

A DECADE has scarcely passed since tonsillectomy replaced tonsillotomy. During the past few years it has become the operation always chosen when dealing with diseased tonsils, and has proved of undoubted benefit in improving nutrition in a large percentage of those cases in whom such an operation was clinically indicated. For the first few years the operation was attended by a mortality rate that deterred many from recommending it. Great improvements in the surgical procedure have however been made, and under skilled hands and with proper precautions the mortality percentage may now be regarded as almost negligible. Many physicians, however, have questioned whether the removal of such an important mass of glandular tissue may not be followed by some untoward after results.

The tonsils are found in all animals from the reptilian stage up to man, but in man they are much more complicated than in the lower animals. It is therefore probable that they possess some function, even although the nature of the function has not been established. Nevertheless, the injurious effect which diseased tonsils may exert in undermining health is now recognized by all. The dangers are lest we overestimate the benefits that may result from the removal of tonsils showing only a slight hypertrophy which, under improved conditions may subside or in the hope of doing away with an infection arising from other foci.

In a recent paper read by Dr. Kaiser, of Rochester, N.Y., before the Section on Diseases of Children, at the last annual session of the American Medical Association, "On the effect of tonsillectomy on the general health in five thousand children, we have presented to us the first careful study of the after results from this operation. An annual opportunity for the study of the problem was offered in a special clinic where approximately ten thousand children were operated upon during a period of five months, and re-examined in a year's time. By co-operation five hospitals in Rochester made it possible for every child in that city to have the operation performed under the most favourable conditions. An organization was formed and fifty thousand children were examined for signs of trouble arising from enlarged or diseased tonsils. Every child in whom such signs were found was given a very complete physical examination in which special attention was given to the general nutrition, to the presence of any glandular enlargement attributable to infectiou from the tonsils and to the condition of the ears and of the lungs. When there was any doubt as to the advisability of the operation the child was declined. Before any arrangements were made, a careful history was obtained from either the mother or nurse, and all complaints which might be referable to a diseased condition of the throat were noted. The most important of these were mouth breathing, frequent sore throats, frequent colds, enlarged cervical glands, ear trouble, frequent attacks of fever, and joint pains or growing pains. These reports were carefully tabulated, and were afterwards arranged in four classes. In the first were placed children with definitely hypertrophied tonsils who presented clinical evidence of infection. This class comprised 73 per cent of the total. A second class comprised children who with little apparent hypertrophy showed signs of some infective process. This class contained 22½ per cent. A small class comprising only 3½ per cent. of the total was formed by those with hypertrophied tonsils and adenoids, but without any clinical evidence of infection. A few amounting to only 1 per cent appear to have been operated upon who presented neither abnormal tonsils nor evidence of infection.

The operations were performed in the morning by skilled laryngologists, and every precaution was taken to ensure the safe recovery of the child. No directly fatal result occurred, but some undesirable complications followed the operation. Post operative bleeding took place in a number, but in no instance was there any failure to control it. Febrile reactions in a few cases ensued, usually due to a coincident respiratory infection. Eight children afterwards developed diphtheria, of whom three died, owing to the fact that it was recognized too late for an effective employment of antitoxin. Eight developed pneumonia. Five children out of the ten thousamd operated upon developed

a lung abscess. Catarrhal and purulent otitis media as an after sequence occurred in about one per cent. of those operated upon, but there was no mastoid involvement. About two per cent. of the children suffered a considerable loss in weight subsequent to the operation, but all regained this loss in a few weeks time.

At the end of a twelve month five thousand of these children were carefully re-examined. The greatest improvement occurred in the group that showed evidence before operation of obstruction and infection. Considerable improvement in general health was noted in the group that presented evidence of infection due to the tonsils, but in whom there was no marked hypertrophy. No marked change was found in the general condition of those children operated on for hypertrophy only. In a few of the 5,000 operated upon, improvement in nutrition was rapid. In 29 per cent. malnutrition still persisted, indicating that enlarged or diseased tonsils are only one of many factors interfering with normal nutrition. Considering the group as a whole mechanical relief from obstructive symptoms, freedom from many subjective symptoms, definite mental improvement, and a lessened incidence of sickness, was the report given by 83 per cent. of the mothers. It is noteworthy, however, that in a few children new complaints developed after the operation. While enlargement of the cervical glands existed in 43 per cent. of the children operated upon, 55 per cent. of these were free from such enlargement when examined at the end of the year. On the other hand 22 per cent. of the children who had been free from this symptom before the operation showed definite glandular enlargement when re-examined later. Twenty-five children complained of attacks of epistaxis, a troublesome ailment which had not occurred previously. Laryngitis and bronchitis developed in a number who had been previously free from such complaints. Rheumatic fever developed in two who had been operated on. It is perhaps too early to state definitely whether tonsillectomy does protect against the common infections. It was noted, however, that the incidence of diphtheria and scarlet fever among those operated upon appeared to be much less than that among other children in the city, but the incidence of mumps, of pertussis and of chicken pox was higher.

In Dr. Kaiser's report the necessity for a careful preliminary examination was emphasized if the surgeon would avoid accidents. Two instances in the same city of a fatal issue following the operation occurred in children who had not had a careful preliminary examination. It must also be remembered that the removal of diseased tonsils does not remove other important sources of infection frequently met with, alveolar abscesses, sinusitis, pyelitis and an unhealthy state of the intestinal tract. If the operation is undertaken, it should be done thoroughly by a trained specialist. Incomplete removal of all diseased tissues while removing obstructive symptoms may fail to relieve signs of infection. It must also be remembered that after the acute catarrhal and influenzal infections so frequently met with in children during the spring and autumn months, enlargement of the tonsils may occur and disappear under improved health and more genial weather without operation.

Adenoids are similar in tissue and are closely associated with the tonsils in all infective processes, and their enlargement often calls more imperatively for their removal than does that of the tonsils. In a recent investigation carried out in the University of Illinois (*Proc. Inst. Med.*, Chicago, 3, 195, 1921), Pilot, Isadore and Pearlman found that adenoids in a similar degree to the tonsils were to be regarded as foci liable to harbour dangerous micro-organisms, and Hambrecht and Negum (*Arch. Int. Med.*, May, 1922) report that the bacteriological findings in cultures made from excised adenoid tissue followed closely the findings of cultures from the tonsil of the same patient. In 218 patients reported previous to operation as clinically in need of tonsillectomy, microscopic examination of the excised tonsils gave evidence of a pathological condition in 93 per cent. In this 93 per cent., haemolytic streptococci were present in 96.1 per cent., and were present as the predominating organism in 85.4 per cent. In the 7 per cent. of normal tonsils haemolytic streptococci of all types were present in 28 per cent., pneumococci in only 14 per cent, and staphylococci, and many heterogeneous organisms in 58 per cent.

Chronic lacunar tonsillitis was the most frequent pathological condition found occurring in 42 per cent. chronic interstitial tonsillitis in 21 per cent.; chronic peri-tonsillitis in 6 per cent.; abscess in 10 per cent.; lymphatic hyperplasia was the only change met with in 4 per cent. In nearly every instance the same organisms were isolated from the adenoid tissue as from the tonsillar tissue.

Although removal of the tonsils and adenoids reduces greatly the number of bacteria in the nasopharynx it does not cause their disappear-

ance. Examinations of normal throats revealed the same groups of organisms, but in greatly lessened numbers; from which it may be concluded that these bacteria are a part of the usual floral of the nasopharynx. The presence of the haemolytic streptococci in such large numbers is stressed by these investigators as most important. The rôle of these organisms as the active causative agent of many clinical conditions is well established, especially in respiratory affections, while the ability of these bacteria to produce lesions in the stomach, gall bladder, appendix, and endocardium secondarily to the primary foci of infection in the tonsils is affirmed by many authorities. An interesting report (*Brit. Med. Jour.*, June 3, 1922) of a severe epidemic of tonsillitis in a public school in England, which was followed in a number of instances by an attack of acute appendicitis, was quoted in a recent address by Lord Dawson of Penn. A. D. BLACKADER.

Acute Barbital Poisoning.—Boenheim relates that among the 286 cases of acute poisoning in Sick's service at Stuttgart in thirteen recent years, acute barbital (veronal) poisoning formed 5.7 per cent. of the whole. The drug had been taken with suicidal intent, and five died. These had all taken over 10 gm.; up to this amount the prognosis is not grave, although no specific antidote is known. Even with large doses of the drug, complete restitution may occur. Rosenberger, by promptly rinsing out the stomach, saved a patient who had taken 30 gm. of phenobarbital. The main symptom with barbital poisoning is the drowsiness to the deepest coma. Other features are the instability of the temperature, and the tendency to pneumonia. The latter almost inevitably proves fatal. There is no vomiting; the digestive tract does not seem to suffer. The main point of attack is the peripheral circulation. The drug seems to paralyze the walls of the capillaries so that vasomotor disturbances are constant. This may entail secondarily pulmonary edema. The suspicion of morphin poisoning is discredited by the good respiration and pulse, and the fact that the pupils react well to light. The play of the pupils, dilating and contracting at brief intervals, is characteristic. The absence of the abdominal reflexes, with retention or exaggeration of the tendon reflexes, is also instructive. Likewise the rapid shifting of the phenomena. The barbital can be detected in the urine. Caffein injections may be required. The danger is past after two days, provided pneumonia or pulmonary edema does not develop. *Brit. Med. Jour.*, June 3rd, 1922.

The Potency of Commercial Vitamin Preparations.—Owing to the rapid growth of the traffic in commercial vitamins, E. V. McCollum and Nina Simmonds, Baltimore, examined some of these preparations for their potency as sources of the most stable of these, the water-soluble B or vitamin B, the antineuritic substance. Any one who is familiar with the chemical properties of the vitamins knows that there is little prospect of making concentrated preparations of any vitamin, other than water soluble B, which contain any more active substance than is obtainable in certain foodstuffs that are easily procurable. It is, in fact, the water-soluble B or antineuritic substance that is most promoted commercially. The antiscorbutic substance, the vitamin C, is so unstable that it would seem to be impracticable to obtain it in concentrated form for use as a substitute for fresh vegetable foods, which are, in general, very rich in it. The authors have tested six of the products for vitamin B which have been more or less widely advertised, and they present the results of their studies. An examination of the labels on the containers of the vitamin preparations studied suggests at once that their promotion for therapeutic purposes represents a repetition of the "patent medicine" frauds which have for so long been perpetrated on the American public. Thus, the same list of symptoms that were listed on the sarsaparillas, blood purifiers, kidney remedies, remedies for female weaknesses, etc., reappear as conditions for which the vitamin preparations are said to be specific remedies.—*Jour. Am. Med. Association*, June 24th, 1922.

Editorial

THE ADDRESS IN MEDICINE

IN selecting the theme for his address, Dr. Barker showed a keen sense of one of the weak aspects of medicine of the present day. The address calls for serious consideration by all thoughtful physicians. It presents a problem which they must face if they are to keep abreast with the advances being made in practical medicine. Although the subject is a difficult one it is to be hoped the address will receive careful study by all physicians, especially by those responsible for the training of the men and women who are to take up the burden a few years hence. Dr. Barker has given a clear leading worthy of his scholarship and wide knowledge of the ancillary sciences that will have an increasing influence on the practice of medicine of the near future. Two observations by way of suggestion may be offered. The first is that unusual and difficult words should, as far as possible, be eschewed. An address, especially one delivered before a general audience, so far as consistent with the author's purpose, should be readily understood by his hearers, so that the closest attention may be given to its subject matter.

The second observation refers to the continuance of old terms which no longer signify that which is intended to be conveyed. This is true of "disposition" and "predisposition". These terms were clearly applicable to the old pathology, but are not so to the new, at least so far as infectious diseases are concerned. The tissue liable to be invaded and destroyed by a microorganism is no more "predisposed" to it than is the prey in the animal world to its destroyer. The chief objection to continued use of these terms is that they obscure where they should make clear the thought so as to leave no room for uncertainty. Clarity of language is important to all by inculcating clearness of thought, especially for the student entering on his course of training. While these criticisms are not vital, still they suggest desirable changes more easily attained if led by one so deservedly influential as the author of this able address.

A. McPHEDRAN

THE METABOLIC RATE AND THYROID DISEASE

DR. HOWARD in an article published in this number of the *Journal*, calls attention to an interesting series of cases presenting most of the clinical features of Graves disease, although the eye symptoms were either absent or less pronounced than usual. There existed in all these cases, however, a discrepancy between the expected and the actual basal metabolic rate, only two of twelve cases giving a rate of plus 14 and 15, the others being within the normal plus or minus 10.

With an enlarged thyroid and typical thyroid symptoms in each case, it is difficult to believe that this gland can be excluded as an important element in the causation of the syndrome, and it throws doubt on the basal metabolic rate as the deciding factor in the diagnosis. The value of this test has proved so great in Graves disease and in toxic adenoma that it must be regarded as a standard procedure, and one on which the surgeon largely depends in selecting the period

for operation. Dr. Howard's results agree with those of other recent observations, and the evidence points at present to a series of cases in which the metabolic rate presents an unexpected normal figure.

In coming to a conclusion, the clinician, whilst welcoming the various laboratory tests, must not be unduly influenced by them. He must weigh all the evidence in forming his opinion, and especially that obtainable from knowledge gradually accumulated over a long period of years by careful and accurate clinical observation.

CANCER OF THE BREAST

IN the fight for supremacy over cancer two tactical plans are being employed. Firstly, along the lines of research, experimental and clinical, investigators are striving to determine the pathogenesis of the disease and its etiology. Much time, labour and treasure have thus far been expended with but a modicum of result and that of a negative rather than of a positive significance. Secondly, and because of the failure of the first, the attempt is made to combat the disease by *early diagnosis*, adopting as a working hypothesis that the best known method of treatment is early and radical removal by the knife. An early diagnosis depends upon, the education of the public to seek medical examination and advice upon the first discovery of any signs or symptoms; also upon the education of the medical profession in methods of examination which may lead to the recognition of those conditions which, from the evidence of our past experience, would appear to be the precursors of, or to predispose to cancer. Having discovered such a condition the physician must have the honest courage to place the facts squarely before the patient. Here is no place for "sympathetic" consideration of the patient's feelings or the trial of "conservative" methods of treatment. Both smack of falsity and of weakness. The truth, as we understand it, must be expressed with candor and firmness and if necessary with almost brutal directness. "Conservatism" either in expressed opinion or in advised treatment so often results in delay with ultimate loss of life.

With special reference to cancer of the breast, Sir George Lenthal Cheatle stands forth as an apostle of this doctrine. For years past he has been laboriously studying such conditions as chronic mastitis and cyst formation and the relation of these to cancer. His writings on this subject may be found in the *Brit. Jour. of Surgery*, 1920, Vol. VIII; Nos. 30 and 31; 1921, Vol. IX, No. 34.

But recently he speaks still more boldly in the *Brit. Med. Jour.*, June 3rd, 1922. In this article he deals with what he terms "the prœmial breast". This term he defines as indicating a condition of the breast which makes it a prelude to later developments of papillomata, simple or malignant, or to other forms of cancer. He regards the term as more accurate than the terms "pre-cancerous" "precursory", etc. He describes the clinical signs and symptoms and defines the differential diagnosis from nodular breasts of physiological activity. He insists that failure is so frequent even after supposedly early recognition of cancer of the breast and its radical and skillful removal, that surgeons must not adopt an attitude of "passive contentment with present treatment".

He draws a parallel between the radical treatment of the prœmial breast in the prevention of breast cancer and the treatment of leukoplakia in preventing cancer of lip or tongue, or of the appendix once inflamed in preventing general peritonitis. He is convinced that the prœmial breast is a definite pathological entity with grave possibilities and in support of this contention he cites cases in which he had diagnosed "prœmial breast"

which upon serial section revealed microscopically malignant disease already present but not discernible clinically.

As already surmised by the reader he advises total removal of the breast and includes the pectoral fascia and the pectoral group of the axillary glands. In his technique he leaves the nipple but warns against the danger of infection unless care be taken. In our opinion this is an aesthetic weakness which is inadvisable. Surely a woman who consents to removal of the breast because of a threat to her life does not expect to retain the nipple, or may even be disturbed by discovering that what is a portion of this "almost cancerous" breast still remains with her.

The article quoted demands careful reading and supplies much food for thought in directions other than those of its defined sphere of "cancer of the breast".

PAPERS AND PROGRAMMES

WHILE we believe all those present at the meeting of the Association in Winnipeg returned home with the satisfaction of having spent three pleasant, interesting and profitable days in the young metropolis of the West, it was a matter of regret that one or two of the sectional meetings did not fill their whole promised programme, owing to the failure to be present of some members of the Association who had promised to read papers. This failure formed the subject of discussion at one of the meetings of the Council, and the opinion was expressed strongly that the promise to read a paper at the Annual Meeting should be regarded as a definite contract not to be lightly defaulted; and that when the author of a paper failed to be present at the time allotted to his paper, his paper should be read by title only. One member went so far as to characterize such defaulting as a habit with some; this we regard as too strong a statement. Promises are given months ahead of the date of meeting, and with professional men unforseen hindrances to the fulfillment of a promise frequently arise. A man of dominant personality once wrote, "for to will is present with me, but how to perform I find not." Many a physician in active practice will sympathize with St. Paul's lament. To express blame too strongly may make many hesitate to attempt a task which should always involve much thought and time; a good paper is not prepared in a day. Papers presenting interesting thoughts and facts in clear concise language, so that those listening may easily appropriate all the important statements, put the Association under a definite indebtedness to the writer. Long papers presenting few or no new thoughts in tedious, inconsequent diction are a definite strain on any audience, and detract much from the interest of a meeting.

In the arrangement of programmes it is always desirable to have as many new interesting thoughts and facts presented in the allotted time as may be possible. Twenty or even fifteen minutes is a long time for the presentation of the important facts in any paper. In many societies, papers are ordered to be read in abstract; the essential facts only are given, and more time is allotted for the discussion in which fresh points are often elicited, adding greatly to the value of those emphasized in the paper. Of still greater advantage is the plan adopted at the meetings of many English and American societies, in which a brief resume of every paper to be presented is placed in the hands of the members a few days before the meeting. This permits those interested in the subject to come prepared to join in the discussion. We believe that in this way more interest would be taken in the several papers, new thoughts would be elicited, and all the members would receive more benefit.

Men and Books

PALÆOPATHOLOGY

THE study of the pathology of past ages, and the various diseases affecting man in the early periods of history has a special interest to physicians of the present day, and adds much to the picture of life in those prehistoric days. Until recently our knowledge of disease in the early days has been confined to the study of the lesions found on examination of the bones in mummies. Sir Marc Armand Ruffer, who unfortunately lost his life at sea while returning from a mission to Saloniki in 1917, devoted many years to the examination and study of mummified material placed at his disposal by the Egyptian government, when the building of the great Assuan dam threatened the inundation of important ancient burial places in Egypt; during these years he devised methods for the successful microscopic study of the soft tissues of these mummies. This made it possible to learn of other diseases than those revealed in the bony structure. Fortunately all his work has not been lost to science as the appearance of an imposing but most interesting volume by his widow indicates. Egyptian embalmers after careful evisceration of their subjects evidently relied mostly on the dry climate and the hot sandy soil to preserve the remaining skeletal tissues. Some bodies, however, escaped the embalmers. and considerable visceral material was obtained from these bodies preserved only by the desiccating powers of the Egyptian climate.

From this material we learn how little many of our more common diseases have altered during the past 5,000 years. The Egyptians of those days suffered from arthritis deformans at a much earlier age, and to a far greater degree than we meet with it now, possibly because peridental infection was not only very prevalent but occurred in severe form. Sufficient knowledge to combat this troublesome affection did not exist, and the prehistoric dentists of whom we have read, appear to have done little excepting pull teeth and very imperfectly fill cavities. Even cave bears and a crocodile, which basked in the sun some 900,000 years ago, have been found crippled with arthritic anklylosis of the vertebræ. A hump backed priest of Ammon assures us of the occurrence of Potts disease arising from tuberculous infection several thousand years before the Christian era. Pneumonia has been demonstrated in many of these old mummies as the fatal lesion, with bacteria still in a stainable condition. Bilharziasis attacked the urinary tract in those days as frequently as it is met with in Egyptians in the present day, and arterio-sclerosis was a common pathological lesion. Achondroplasia, rickets and tuberculosis produced skeletal deformity notwithstanding the fact that the climate appears to have been as dry and sunny as it is now. Evidently many Egyptians became stiff and old by the time they reached the age of fifty years. Even royalty suffered from very bad teeth and infected gums. Baldness was common. A few of their queens have been found almost bald, and the younger princesses permitted the presence of nits in their hair. The existence of syphilis, however, at that early date has not been demonstrated. Food habits appear to have varied during the several ages, and among the different classes of the people. Abderhalden found that the tissues of mummies after 3,000 years were still well enough preserved to yield amino-acids when hydrolyzed, and to permit the recognition of autolysis which had taken place after death; free amino-acids, cholesterol, and fatty acids were found present in the muscular tissues; Hansemann in his examination, found the proteins so little altered in a mummy 5,000 years old that they gave the specific precipitin reaction. On this continent the *Journal of the American Medical Associatian* informs us that Prof. Moodie, of the University of Illinois, has investigated not only pathological conditions, but also specimens of early geological times and has succeeded in finding evidence of bacteria in the mesozoic age. An interesting example was the discovery of evidence of a pathological lesion in the tail of a dinosaur.

A. D. BLACKADER.

Therapeutical and Pharmaceutical Items

IRON AND AMMONIUM CITRATE

It has been noticed that iron and ammonium citrate on the market varied greatly in solubility and in the frequency with which precipitates occurred when made up in solution. Consequently, an experimental examination was made. Nine samples in all were obtained. As iron and ammonium citrate dissolves in half its weight of water, 10 gm. of each sample was agitated in a mechanical shaker with 5 cc. of water. The specimens were examined at frequent intervals.

No. 1.—Large, ruby-red scales. Solution time 10 mins.; 1:20 dilution muddy; heavy precipitate in 3 weeks.

No. 2.—Small granules, dark ruby-red. Solution time 12 mins.; 1:20 dilution dark red, clear, transparent; fairly clear with slight ppt. in 3 weeks.

No. 3.—Very small fine scales with rather an orange tint. Sol. time 20 min. 1:20 dil. like 2; fairly clear with slight ppt. in three weeks.

No. 4.—Very small fine scales, lighter red than 1. Solution time 28 mins.; 1:20 dilution like 2; fairly clear with slight ppt. in 3 weeks.

No. 5.—Fairly small, fine, green scales. Solution time 30 mins.; 1:20 dilution pale yellowish green; fairly clear with slight ppt. and same color as the others in 3 weeks.

No. 6.—Scales smaller and browner than 1 and not so transparent. Solution time 35 mins.; 1:20 dilution like 2; very clear with slight ppt. in 3 weeks.

No. 7.—Scales like 6. Solution time 35 mins.; 1:20 dilution like 2; muddy, with ppt. in 3 weeks.

No. 8.—Smaller than No. 7 but same color. Solution time 40 mins.; 1:20 dilution like 2; fairly clear with trace of ppt. in 3 weeks.

No. 9.—Scales about same size as No. 7 but lighter red than 1. Solution time 40 mins.; 1:20 dilution lighter and more of a yellowish red than the others. Clearest of all, but with slight ppt. in 3 weeks.

A very common prescription consists of iron and ammonium citrate and epsom salts solution, consequently the above were tested as follows:—Iron and ammonium citrate was dissolved in its own weight of water and 5 cc. of this solution was mixed with 5 cc. of a concentrated solution of magnesium sulphate. At the end of four days there were slight precipitates present in all the samples, but in no case was this greater than the precipitate present in the solution of the citrate alone.

The attention of the prescriber may be called to the fact that the laxative effect of magnesium sulphate can be replaced by sodium sulphate with a very marked improvement in the flavour. A concentrated solution of sodium sulphate was tested with iron and ammonium citrate in the same way as above and with the same results.

J. Deas, *Dept. Pharmacy, Univ. of Toronto.*

Acetylsalicylic acid is notoriously insoluble in water. Alcoholic solutions are not suitable under all conditions for administration.

Sodium citrate (1), using four times the weight of acid, has been suggested as a means of overcoming the insolubility, but the original assertion that the drug was not decomposed in this solution has been found to be in error. Leech titrated a mixture of 18 gms. acetylsalicylic acid, 72 gms. sodium citrate and 500 cc. water with normal alkali. The titrations were made over a period of sixteen days. His results show that at the end of four days 50 per cent. of the acetylsalicylic acid had been decomposed, in nine days 75 per cent., and the entire content at the end of seventeen days.

When given in solution with sodium bicarbonate or carbonate or any of the alkalies, this result occurs even more rapidly; if given in powder, bicarbonate may prevent the acid irritating the stomach without decreasing the action of the drug.

The most efficient method of administering acetylsalicylic acid thus appears to be in powder, cachet or tablet form, the first preferred, unless, of course, one desires only the products of the decomposed mixture, i.e., sodium salicylate, etc.

The addition of the "acetyl" ring to the salicylic radical adds greatly to its value in relieving pain. In this respect the acetylsalicylic acid is superior to the sodium salt. The acetylsalicylate is excreted as such in the urine.

References:

1.—*The Prescriber*, June, 1921, p. 247.
2.—*J.A.M.A.*, 78, Jan., 1922, p. 275.

F. W. W. Hipwell,
Depart. of Pharmacology, Univ. of Toronto.

The Association

RESOLUTIONS ADOPTED AT WINNIPEG MEETING

On Income Tax

Moved by Dr. Argue seconded by Dr. Hart and resolved: "That whereas, in the compiling of income tax returns both the Dominion and the respective Provincial Governments allow as a legitimate deduction certain monies expended by a merchant in travelling to the mercantile centres for the purpose of buying, and whereas this is considered a reasonable and justified deduction, and whereas a physician who attends a *bona fide* medical conference or post graduate course of instruction is not allowed this necessary expenditure,

"Be it resolved, that it is the opinion of the Canadian Medical Association this is a proper and reasonable expense, and that it should be allowed as a deduction in compiling income tax returns of a regular practising physician, and that a copy of this resolution be forwarded to the Minister, and to the various Provincial Medical Associations. Carried unanimously."

Moved by Dr. Blake seconded by Dr. Smith and resolved: "That the Canadian Medical Association in session assembled recommend to the Minister of Finance that 10 per cent. of the income of the medical profession be exempted from income taxation over and above the usual exemptions extended by the Act to afford the medical profession a similar consideration extended to manufacturers."

Amendments to By-Laws

Chapter 7, Section 6 the first sentence to read as follows:

"In order that the business of the Association may be facilitated during the interval between its annual meetings the Council shall appoint a Committee to be known as the Executive Committee, and which shall consist of (a) Seven members appointed by the Council from amongst its members and (b) Two representatives from each province to be appointed by the Executive of the Provincial Association and who should be chosen from amongst the members of the Executive."

Chapter 8, Section 1 the last sentence to read as follows:

„Four members of the Committee shall constitute a quorum for the transaction of the business."

Chapter 3, new Section (6).

"That when, and wherever the Canadian Medical Association meets in each of the Provinces, the Meeting shall be held in conjunction with the Provincial Organization, and that the local organization shall have control of the arrangements, and as far as possible, the preparation of the Scientific Programme."

1921 FINANCIAL STATEMENT

20th January, 1922

DR. J. W. SCANE,
Secretary, Canadian Medical Association,
Montreal.

Dear Sir:—We beg to report that we have completed the audit of the books and accounts of the Association for the year ended 31st December, 1921, and attach hereto Statement of Cash Receipts and Disbursements for the period under review.

We have verified the Bank Balance and seen satisfactory vouchers for all disbursements.

The books were in good order, every assistance was given us in the carrying out of our work, and our requirements as Auditors were fully complied with.

Yours very truly,
McDONALD, CURRIE & CO.,
Chartered Accountants.

CANADIAN MEDICAL ASSOCIATION

Statements of Receipts and Disbursements for Year Ended 31st December, 1921

RECEIPTS

Annual Fees	$13,554.49
Advertisements	11,266.31
Reprints	1,629.05
Illustrations paid by Authors	186.54
Premium on American Funds	168.21
Interest on $1,000.00, 5% Ritz-Carlton Bond	75.00
Sundry Sales of Journal	209.09
Sundries	23.50
Overdraft in Bank—31st December, 1921	2,707.54
	$29,819.73

DISBURSEMENTS

Overdraft in Bank—1st January, 1921		17.02
Journal Account—		
Printing	$15,843.79	
Illustrations	961.34	
Murray Printing Co., on account Morang	1,200.00	
Agents' Commission	2,084.27	
		$20,089.40
Reprints		1,399.74
Montreal Medical Journal Co.—Payments to Stockholders, $5,000.00 at 6%		300.00
General Expenses—		
Auditors' Fees	35.00	
Bonus to Dr. Scane (May 1920-December 1921)	250.00	
Legal Fees	51.25	
Postage and Petty Cash	355.00	
Salaries	4,636.50	
Stationery and Printing	357.32	
Telephone and Telegrams	65.95	
Travelling Expenses—Associate Secretary	285.00	
Sundries	45.57	
Bank Charges:		
Collection of Drafts... 151.50		
Interest on Overdraft. 134.94		
Exchange on Cheques. 32.49	318.93	
		$ 6,400.52
Halifax Conference—		
Committee of Arrangements...	$ 135.00	
Travelling Expenses	245.05	
		$ 380.05
Purchase of Canadian Medical Monthly		1,233.00
		$29,819.73

Unrecognized Infections in Production of Carriers of Pathogenic Organisms.—Charles F. Craig, Washington, D.C. (Jour. Amer. Med. Assoc., September 10, 1921), deals with the subject of the contact carrier, the one who has been in contact with the patient and who presents no appreciable symptoms of disease. While it is generally believed that contact carriers have never suffered from the diseases due to the parasites they are carrying, Craig calls attention to the fact that a very considerable proportion of them have presented, at one time or another, symptoms which were undoubtedly due to the parasite they carry. While there is no question that many individuals who have never shown any appreciable symptoms of infection become carriers of pathogenic organisms, it is equally true that many so-ca led contact carriers have, in reality, suffered from symptoms of infection, and are, in effect, convalescent carriers rather than contact carriers of the specific parasite. This class of carriers originates from unrecognized cases of contagious or infectious disease, cases in which the symptoms of the infection were so slight or atypical as to mislead the physician, or cases that have caused the patient so little inconvenience that medical advice was not sought. A considerable proportion of contact carriers belong to this category, and the recognition of this fact is of value to the physician, as it should lead him to a more careful consideration of apparently trivial symptoms and to greater utilization of laboratory aids in the diagnosis of their cause. Craig urges more frequent employment of blood cultures and microscopic examinations of the blood in cases of undetermined fevers; of throat cultures in the apparently mild inflammations of the throat and nose; and of microscopic examination of the fæces in patients suffering from diarrhœa and other intestinal symptoms, to detect these infections and prevent their spread.

Fatigue and Malnutrition of Children.—Veeder cites two cases to illustrate how fatigue alone may be responsible for failure to gain weight and develop along normal lines. The question of sleep is very closely bound up with the subject of fatigue and malnutrition. While it is absolutely impossible to lay down fixed hours for each age and, further, so many variables enter in, as the place of sleeping, sleeping equipment, general physical condition of the child, the amount of physical exercise or work the child performs, and the like, that latitude must be allowed and common sense used. But Veeder believes there is a minimum, and he has arbitrarily fixed a minimum table, based largely on the amount of sleep of physically fit children, and in practice it has been fairly satisfactory. From one to two years, thirteen hours; from two to four years, twelve hours; from four to six years, eleven hours; from six to ten years, ten hours; from ten to fourteen years, nine hours. As a matter of fact, most children take more. But a normal, active child who takes less is on the danger line so far as normal development is concerned.—*Jour. Am. Med. Association*, September 3rd, 1922.

Abstracts from Current Literature

SURGERY

The Injurious Effects of Early Extraction of Teeth. *Simon, Bela. Budapesti orxosi ujsag,* February 16th, 1922.

The too early removal of the milk teeth and some of the permanent teeth is an injury which is not easily rectified. It necessitates a revision of the indications for extraction up to the twelfth year, and the danger is, first, to the milk teeth and then to the permanent molars. It is easy to undervalue the importance of milk teeth because they fall out so early, but the length of time before the next set appears must be remembered. The first permanent molar may become carious or pulpous and because it is very difficult to treat the pulp in a 6 or 7 year old child, the parents often have the tooth extracted. The physician should explain to the parents that the first permanent molar is not a temporary milk tooth. It appears at six years of age and does not take the place of a milk tooth. Generally speaking, this tooth is large, the prominences are pointed and intact and the sulcus is well developed. Removal of this tooth removes the function of the opposing tooth. Chewing surface is lessened by a third when a second milk molar is extracted and the results of insufficient chewing are well known.

The configuration of the face depends on the condition of the alveolar process and early extraction prevents its full development. This is especially true of the first permanent molar which has a large chewing surface and supports the cheek. This tooth determines the height of articulation when in occlusion with its antagonist. This occurs until the milk teeth fall out and the permanent teeth in occlusion form the same conditions. Conservative treatment should be attempted even without prospect of success as the arrangement of the other teeth depends on the first molar. The dangers of extraction are lessened as the twelfth year is approached. Periostitis is the only indication and this should be prevented by all known measures.

A. T. Bazin

Differential Diagnosis of Salivary Calculi. *Boss, William, Beitr. z. klin. Chir., No. 2, Tubingen,* 1922.

A report is made of 8 cases of sialolithiasis, a condition of which there is only 1 case on record before the year 1915. Roedelius made the same observation at the Eppendorf Hospital where he saw but 2 cases before the war and 6 during it. Boss thinks the change in food during and after the war is responsible for the increase. Sialolithiasis is a disease of middle age and is more frequent in the male sex. The most common site is the outlet of the duct of the submaxillary gland. One of Boss' cases involved the duct of Stenson and 5, Wharton's duct. The symptoms of this condition are known: stomatitis which may lead to severe phlegmon of the floor of the mouth, with interference in opening of the jaws and disturbances in nutrition. There are also pyorrhœa salivalis, salivary colic and pus from the red and inflamed outlet of the salivary duct. The characteristic colic which is seen in stone in the duct comes when the obstruction is solitary and the duct completely blocked, thus interfering with the outflow of saliva. The colic may be absent if there are several small stones, as the saliva may find an outlet between them.

Boss recommends sounding of the duct of the submaxillary and lingual salivary glands in all cases of tumour of the floor of the mouth, and puncture of the tumour if the diagnosis is not cleared up with the former procedure. This will prevent many errors in diagnosis. The differentiation between carcinoma of the floor of the mouth and salivary tumour cannot be made by considering the consistency, configuration or relations of the tumour to its base or surroundings. The variation in size is characteristic of salivary tumour and is caused by the accumulation of saliva. It is difficult to demonstrate the stones by X-rays, and the results are not reliable as the shadows of the stones may be covered by that of the jaw and a case is on record in which a carcinoma of the floor of the mouth was mistaken for stone of the salivary duct. Mere removal of the stone is not sufficient, as recurrences are frequent. The gland also should be removed especially in late cases, this recommendation being based on the degeneration and functional changes found in it. The conservative procedure is preferable only in cases of the parotid, on account of the facial nerve and other anatomical difficulties.

A. T. Bazin

Abduction Treatment in Fracture of the Neck of the Femur. *Dorrance, Georg M. and Murphy, Eugene C. Penn. M. J.*, April, 1922.

On admission to the hospital an x-ray picture is taken of the injured member and a stereoscopic view. On the following day the patient is taken to the operating room and given a general anæsthetic. The perineum is brought down against the perineal post, the sound limb is brought out to the side to its extreme limit of normal abduction, the foot is placed in the stirrup where it is fixed, with a moderate degree of traction exerted. The treatment of the fracture depends upon the position of the fragments and the resulting deformity. To correct the usual deformity in a fracture of the neck of the femur, the assistant makes traction downward with a strong pull and the operator makes traction outward in the upper third of the thigh and at the same time manipulates the fragments into position. The limb is then placed in the position of abduction to the same degree as that permitted on the normal side. By this means the neck is brought to a horizontal plane. The capsule surrounds both fragments. The head is fixed in the acetabulum. Consequently the tension of the capsule aligns the two fragments and forces an end-to-end contact. In extreme abduction, the upper border of the shaft fragment and trochanter are opposed to the rim of the acetabulum and the side of the pelvis. The foot is rotated inward in the slightly overcorrected position, the limb is measured and compared with the measurement of the normal limb. If there be no shortening, the foot is placed in the stirrup and fixed in position with firm traction exerted downward. Application is made of a layer of table felt, which has been cut and rolled into bandages. This is applied from about the middle of the thorax down to and including the foot of the fractured side and well down over the buttocks of the opposite side. This spica cast is reinforced on the outer side by a rod of iron, ½in. wide, extending from the upper extremity of the cast to the external malleolus. The inguinal region and the knee are also reinforced, using a heavy wire mesh. The plaster spica is completed in two layers, covering the entire surface, including the foot. A large pad, which is to be removed after the cast has set, is inserted under the felt over the abdomen. After the cast has set, the patient is placed in bed with the head of the same elevated. As soon as the patient is out of the anæsthetic, the cast is trimmed out around the genitals and rectum. A stereoscopic picture of the fracture is taken the following day. A Balkan frame is placed over the bed and a bird-swing placed at the head of the same. This permits the patient to elevate himself for the use of the bed-pan. The cast just above the foot is suspended to the Balkan frame by means of a rope and pulley so that the correct amount of counterpoise will balance the foot in any position. After the third day the patient is changed from side to side. After the first week, if strong enough, he is placed in a wheelchair for a few hours each day. Casts are permitted to remain on patients from 13 to 16 weeks in all patients over 55 years of age. Impacted fractures should be broken up when they interfere with function. A. T. Bazin

Causes and Diagnosis of Pain in the Spinal Column. *Haas, J. and Eisler, F. Wien. klin. Wchnschr.*, February 16th, 1922.

Examination was made of 109 cases of pain in the spinal column with diagnosis as follows: (1) Osteomalacia of the spinal column, 28 cases. There are two forms of this, one in adults and the other in adolescents. In the former the chief complaint is of exhaustion, and of more or less localized pain on pressure; there is also spontaneous pain, especially after movement, often of a neuralgic or sciatic character, and sometimes there is local œdema. The roentgen picture shows atrophy and a deformity of the bodies of the vertebræ in the shape of a biconcave or wedge-shaped change in the profile of the body of the vertebræ. In adolescent osteomalacia the roentgen picture shows kyphosis or scoliosis and accompanying changes in other parts of the skeleton, for example, the epiphyses. Osteomalacia of the spinal column gives almost the same symptoms as the condition described by Schanz as "insufficiency of the vertebræ". (2) Spondylitis deformans, 15 cases. These were all in persons over 40 years of age, and mostly after trauma or long-continued over exertion. The changes in the spinal articulations were similar to those in arthritis deformans of other joints. The roentgen picture showed deformations caused by osteophytes, broadening of the joint surfaces, and a preponderance of hyperplastic processes over the resorptive processes characteristic of osteomalacia. Differential diagnosis from osteomalacia is often made difficult by the fact that the two are combined. (3) Ankylopoietic spondylitis, 11 cases. This begins in early youth and progresses by fits and starts;

in the later stages there is total kyphosis, spastic fixation of the whole spinal column and progressive ossification of the ligaments. In the beginning there is slight, and later, pronounced, atrophy and bone proliferation at the joint processes, with formation of bony processes between the bodies of the vertebræ. Bechterew's disease (14 cases) is not a separate entity, but belongs in this group. (4) Rheumatic spondylitis (2 cases). This can be diagnosed only by exclusion of rheumatic affections of other joints. Roentgen examination negative. (5) Tumour metastases, 3 cases. There is circumscribed sensitiveness on pressure with constant pain. Roentgen picture generally negative; often clear foci. (6) Tuberculous spondylitis, 39 cases. Differential diagnosis is not necessary except in cases where pronounced destruction has not yet taken place. The cases are in young people; there is a dull pain in the lower thoracic and in the lumbar vertebræ; no pain on pressure, no increase of pain if weight is applied in an axial direction; on motion there is spastic fixation. The roentgen picture is normal at first, later there is a slight decrease in the intervertebral space, or wedge-shaped deformity of a vertebra. Pain in the spinal column may occompany diseases of internal organs, such as affections of the bronchial glands, dilation of the aorta, cholelithiasis and nephrolithiasis. A. T. Bazin

Early Symptoms of Spinal Cancer. *Oppenheimer, Edgar E. J. Bone and Joint Surg.*, April, 1922.

Carcinoma of the bodies of the vertebræ is not a very unusual condition. From a study of 32 cases Oppenheimer has concluded that the early signs of root involvement from carcinoma have the following clinical manifestations. The symptoms are those of sensory root irritation as distinguished from a peripheral nerve lesion. What is usually designated as a bilateral sciatica considering the pain and its distribution, will, on careful examination, be found to correspond to one or more roots of the sacral plexus. When the spine higher up is involved, the symptoms are clearly segmental in character; usually other sensations are intact and the motor sphere is involved late in the disease. The pain is always greatly exaggerated by immobilization; is more or less continuous and prevents but does not interrupt sleep as does the pain in spondylitis. These symptoms appear with or without spinal rigidity and are not infrequently present when the radiograph of the spine is negative. They are in themselves not characteristic but should always arouse suspicion and encourage the search for primary carcinoma and, in conjunction with other suspicious signs, often secure the diagnosis. It is often possible to foretell the ultimate vertebral breakdown long before it actually occurs and not so rarely before the radiograph gives positive results. Of these changes, the most typical is slight dislocation forward, so that there appears a more or less definite recession of particularly one or a few spinous processes as they are successively palpated from above downward. In some of the more marked cases the palpating finger suddenly meets with a sharp depression as it reaches the subluxated vertebra. In another group of cases the writer has been able to discover the presence of slight later displacements which only months afterward became pronounced. In still another group, he has been able to demonstrate the compression of the bodies of individual vertebræ as it occurs very early in the disease and before it is apparent in the radiograph, by what he thinks is a change in the relation between the adjacent spinous processes; more often the change in the height of the vertebræ is complicated by a variable amount of torsion. These changes in the contour are not absolute criteria in the absence of other symptoms. They are, however, very suggestive in connection with other symptoms not in themselves definite, and should lead one to suspect cancer, and therefore stimulate a most thorough search for other evidence of carcinomatosis.

An abstract and analysis of 32 cases of carcinoma of the spine seen at the Montefiore Hospital, New York, is appended. A. T. Bazin

Treatment of Hæmorrhoids. *Harbin, R. M. J. M. A. Georgia*, March, 1922.

The usual indications for operation are hæmorrhage, pain, protrusion and itching. Before operation has been advised, a general examination should be made for bladder tenesmus, stricture or cancer of the rectum. If any impassable stricture of the urethra should exist, troublesome retention of urine may follow. The preliminary treatment is very important, and consists in giving 2 oz. of castor oil at 4 P.M. the day before, and a soap suds enema three hours before operation. The lithotomy position is preferred. Dilating the sphincter muscle should be done with care. In only a very small percentage of cases does Harbin prefer the ligature and excision method, where tumours are very numerous and

large, and with some prolapse of the rectum. The great objection to this method is the prolonged convalescence and postoperative pain. In the clamp and cautery method there are no open lymphatics, a fact which to his mind explains the comparative absence of postoperative pain. In his experience it is an exceptional occurrence that morphin is needed. From a review of 83 operations by ligature and excision, and 63 by clamp and cautery, it appears that postoperative comfort and shorter convalescence favour the latter. A. T. BAZIN

The Present Status of Epiplopexy. *Gibbon, John H. and Flick, John B. Ann. Surg.*, April, 1922.

In one hundred and five cases collected by Greenough, the mortality within thirty days was 29.5% and the improvements, 42%. Mayo reports twelve deaths in twenty-eightcases, while sixteen were relieved. Moynihan reports one case cured and one relieved out of seven operations. The writers feel that the procedure results in cure in about 10% of cases and in benefit to a much larger number. In the portal type of cirrhosis, biliary drainage, except as the operation produces adhesions, could be expected to do little good and in the biliary type, epiplopexy could hardly produce a cure. The alcoholic cases give the best results and the syphilitic the worst, while Greenough concludes that the hypertrophic type gives better results than the atrophic. In all of the writer's ten cases, the liver was contracted and the results were better the earlier the operation was performed. When the ascites is of slow development, the prognosis is better than when it is rapid. The operation should be as short and simple as possible; two rows of mattress-sutures fixing the omentum to the parietal peritoneum on either side of the midline being sufficient. Gas-oxygen anaesthesia is probably the best. The operative mortality in this series was 20%, one dying of pneumonia and one of peritonitis, both occurring before the above mentioned simple technic was instituted. Most operators have eliminated friction of the liver, spleen, and diaphragm because it causes shock. The reaccumulation of fluid does not mean that the operation has been a failure as many successful cases have been tapped postoperatively.

A. T. BAZIN

Intra-Abdominal Torsion of the Great Omentum. *Cano, Julio Oritiz. Cron. M. chir. de la Habana*, January, 1922, P. 158.

A patient, thirty-eight years of age, who had had an inguinal hernia at the age of ted years uncompli cated, cured blenorrhagia, and dyspeptic symptoms lasting for many years, developed loss of appetite, gastric pain which was relieved on the ingestion of food, persistent constipation with excretion of mucous, gastric hyperacidity, and pain on palpation of the umbilicus. Belladonna, valerian, and a suitable dry diet, relieved the pain somewhat; however, it reappeared later. As purgation and belladonna had no effect, and peritonitis was suspected, operation was performed. Incision over the iliac fossa elicited a large quantity of red, serosanguineous fluid; a portion of the omentum seemed greatly congested. A tumour the size of the head of a fetus was found closely attached to the omentum, presenting recent adhesions to the parietal peritoneum and to several coils of the intestines. This growth was isolated and removed. Six catgut ligatures near the colon facilitated the ablation of almost the entire great omentum. Two drainage tubes were left in place. Recovery was uneventful.

A study of the cases in the literature permits their classification into 3 groups: (1) omental torsion without hernia, (2) omental torsion combined with irreducible hernia, (3) hernia devoid of intestinal loop. Of these types, omental torsion without hernia is the least frequent, and is never recognized before the exploratory operation. In all such cases there are adhesions between the epiplon and the pelvic organs, and sometimes associated tumours. It is certain that a direct connection exists between epiploic torsion and inguinal hernia. In cases of irreducible hernia, when the torsion is intrasaccular or parasaccular, the diagnosis is not difficult if omental volvulus is taken into consideration. The sudden onset, the special intensity of the pains, irradiation of the abdomen, and the formation of a hard, tense cord at the level of the internal inguinal orifice, are sufficient to establish the diagnosis. In cases of hernia devoid of intestine, in which there is apparently no relation between the abdominal tumour and the hernia, it will generally be found that the absence of hernial content is of short standing, and that the lesion is due to unskilful reduction of an old hernia. The presence of hernia is the guiding factor in the diagnosis of omental torsion. The condition should always be suspected in the presence of acute abdominal symptoms and hernia, unless it is definitely contraindicated by specific diagnostic signs. A. T. BAZIN

Some Preventable Causes of Adhesions. *Willis, Park Weed, Northwest Med.*, March, 1922.

Surgeons have not been sufficiently diligent in taking precautions against adhesions that may follow abdominal surgery. These occur so frequently as to warrant attention to any means that may tend to prevent them. Willis has been called to several cases in which adhesions could have been prevented by a little care. In the case of a patient upon whom an emergency operation had recently been performed, he found that in the hurried closure of the wound (owing to the patient's condition) a portion of small intestine had been caught and fastened to the wound by sutures, causing a more or less general peritonitis and a fecal discharge from the wound. Shortly afterwards he handled the case of a man upon whom gastro-enterostomy had been performed a few months before. Upon opening the abdomen he found that the peritoneum had retracted for some distance on either side of the wound, and the stomach was over a considerable area adherent to the abdominal wall between the edges of the peritoneum. Evidently, approximation of the peritoneal wound had not been secured at the time of operation. The omentum is particularly likely to slip under an abdominal stitch and, by fastening to the line of incision, this necessarily makes an adhesion. The surgeon should always take sufficient time to make a careful closure. He should use as much care in this respect as he expects the nurse to use in the counting of sponges. The worst adhesions Willis has ever encountered, except in cases of tuberculosis or malignancy, were in a case where the only explanation lay in the supposition that the water used in sponging had been too hot. These adhesions were located away from the seat of the old operation, and the surgeon who had formerly operated admitted they were probably caused by a large, hot, wet pack used to keep the intestines out of the way. Since that time, the hospitals in Seattle are trying to arrange a uniform system for use of thermometers, so that the surgeon may know exactly what temperature he is using. Some patients are much more susceptible to heat than others. In the use of hot water, the temperature should never be above that which would be non-irritating to any patient.

A. T. Bazin

MEDICINE AND PATHOLOGY

Experimental Investigations on the Physio-Pathology of Arterial Blood Pressure. *Marassini, A., Arch. di fisiol.* 1920. *Arch. per le sc. med.*, 1921.

The writer has studied the blood pressure in compensating intravenous injections of saline solution. He finds that the salt solution injected after corresponding abstractions of blood does not restore the former level. However, where a great deal of blood is removed and the salt solution substituted in its place, the blood pressure does not attain the former height but may be maintained at a sufficient level to preserve life. If the blood-letting is repeated many times and the blood loss compensated with an equal volume of 0.7 per cent. sodium chloride injected through the jugular vein (in dogs), the average blood pressure becomes lower each time. If the salt solution be injected in relatively larger quantities so as to increase the total amount of circulating fluid, the blood pressure reaches very high levels, but only temporarily, descending to one which is out of proportion to the quantity of injected fluid. The lower the hæmoglobin index and the higher the blood pressure, the greater is the quantity eliminated from the circulation, of the fluid injected for compensating a great loss of blood.

The important point is that, if the blood extractions are moderate in quantity and frequently repeated, and if the blood lost is compensated each time with an equal volume of physiological salt solution, the average blood pressure undergoes progressive diminution.

C. F. Martin

Intracardiac Injection of Adrenalin for Syncope after Administration of Chloroform in Infancy. *Bliedung C. Münchener Medizinische Wochenschrift*, January, 1922.

The article is interesting as informing us of the first case where intracardiac injection of adrenalin has been able to restore life.

The patient treated had been placed under chloroform anæsthesia for a short operation on the eye, during which period a gram of chloroform was used, Five minutes after commencing its administration, the child suddenly became pale, the respirations shallow and the pulse

small. Both respirations and pulse then ceased in spite of artificial respiration one minute after the cessation of using chloroform. 0.2 c.cm. of adrenalin (1-1000) was injected into the heart by puncture through the fourth intercostal space, close to the sternum. A needle of 3½ cm. was used. Almost instantly thereafter, the cardiac beats were restored and respiratory movements occurred.

According to the writer, there is little importance as to whether the injection is made into the myocardium or into the cardiac cavity. The essential thing is that one should avoid the danger zones and not use too strong a dose of adrenalin. Moreover, this method does not apply to hearts that have organic disease due to any previous infection, or hearts in which the failure has already been treated by cardiac stimulants.

C. F. MARTIN

Gastric Ulcer of Syphilitic Origin. *Cade; A., and Morenas (of Lyons). Arch. Mal. de l'App. Digestif. Vol. XII*, 1922.

Two cases are recorded by these observers, in which clinical observations were controlled by pathological anatomical evidence. There was a round ulcer of the stomach in one case, due to syphilitic lesions of the gastric vessels. This fact is of very special importance to the syndrome of gastric ulcer. It was observed in a man of ripe age suffering from abnormal gastric pains, coming on at indifferent times, and accompanied at times by hyperchlorhydria, and often with marked hæmatemesis. The anatomical examinations showed macroscopic vascular lesions, and, microscopically, that these were the origin of the ulcer. The character of these lesions opens up the question of anti-syphilitic treatment for these ulcer cases; it should be tried in the case of doubtful ulcers, and unsatisfactory results should alone determine the need of surgical interference. Gummatous ulcers of the stomach yield rapidly to treatment.

C. F. MARTIN

On the Pathogenesis of Death from Scalds. *Cevaric, L., Pathologica*, 1921.

This subject, which is dealt with experimentally, was carried on by means of investigations on healthy white rats joined in pairs by lateral coeliostomy. One of each pair was scalded, while the other was left untouched.

The results of the investigations, which covered the examination of the central nervous system, spleen, kidneys, blood and hæmatopoietic organs generally, showed that some toxic substance is produced causing changes in the hæmatopoietic organs, central nervous system and the blood, a toxic substance which affected both the scalded and the non-scalded animals. In the nervous system marked chromatolytic changes were found as in other acute experimental poisonings. In some cases, pneumonic and renal inflammatory changes were found. The chief interest lies in the fact that the non-scalded animals were affected equally with the others.

C. F. MARTIN

The Nature of Functional Disease. *McDougal, Wm. Am. J. Psychiatry*, Jan. 1922.

The writer opens his address with words of high praise of the attitude of Americans toward mental hygiene and their progress in the treatment and prevention of mental disorders, mentioning especially the establishment of psychopathic hospitals. The problem of the nature of functional disease is really that of structure versus function, or, in other words, that of mechanism versus vitalism. If the human organism is in every way comparable to a machine, disorder in the working of the machine could logically be attributed to some mechanical or chemical variation or defect in its parts.

The advances in biology, physics and chemistry in the nineteenth century tended strongly to establish this mechanistic view and profoundly affected medical science,—even mental medical science. Research was devoted to the study of brain structure, of defects which were assumed to underlie all mental disorders, and certain valuable results were achieved. But this led to the neglect of the psychological study of mental disorders and functions and, in consequence, the advance in the study and practice of psychiatry was disappointingly slow. Moreover, the search for a structural basis in psychoses led to a strict separation of these from the neuroses, which were considered merely functional and consequently despised and neglected, being regarded as mere products of the imagination. Dr. Pierre Janet in France and Dr. Morton Prince in America stand out preeminently as men who did not hold these views of the neuroses.

The general change of view, McDougal attributes to two causes; first, the large number of cases of psychosis and neurosis in the War; second, the work of the psychoanalysts. To the latter he gives the credit of having quickened

the interest of the medical profession, and of the world at large, in psychological study, brought functional diseases out of their place of neglect, and helped to break down the artificial barrier between psychoses and neuroses. No longer can we regard the human organism as strictly comparable to a machine. The purpose for which it exists resides in itself and is self-regulating. Hence, functional disorder arises when environmental changes demand adjustments exceeding its powers of adjustment.

Purpose implies mind. Mental purposive operations go on on very different planes of consciousness. Functional disorders are commonly the expression of failure and disharmony of conflicting purposes which may be wholly or in part subconscious. It is, therefore, through mental influences that functional disorders are brought about. They are psychogenic. Bodily disorders may result from emotional disturbances, for instance, death from great emotional shock.

The writer then proceeds to discuss psychogenesis in the psychoses, and cites Kræpelin as taking a neutral standpoint, but leaning towards structural causation, while he has argued forcibly for the psychogenetic origin of dementia præcox. Mott, on the other hand, has described pathological changes in cases of dementia præcox, namely, mal-development of the sex glands and, in some of the brain neurones, an excess of lipoid granules, indicating hypofunction or diminished metabolism,—changes which Mott considers to be evidence of the structural origin of the disease. To this McDougal replies with the argument that, if structural changes can result from an excess of function, (as for instance, those due to excessive and prolonged activity occasioned by strong instinctive tendencies such as rage and fear,) it is reasonable to assume that changes such as excess of lipoid granules may result from diminished oxidation and metabolism, brought about by checking and depression of instinctive activities, as may happen in dementia præcox through unfortunate mental influences. Here must be assumed a congenital predisposition which renders the patient peculiarly liable to such depression of instinctive emotional tendencies. The demonstration of organic changes in a case of mental disease of some standing does not, the author contends, prove the disease to be of organic origin.

In many cases of exophthalmic goitre, functional disturbances seem to precede organic changes, notably those arising from prolonged or repeated excitation of the fear instinct. A vicious circle is established in which the emotion excites the bodily and chemical reactions of fear, and these in turn render the organism more responsive to impressions exciting fear. Here we have an organic disorder resulting from mental impressions. Why not then look for a psychogenetic origin in such conditions as dementia præcox, manic, depressive and epileptic insanities? In these latter fear may play a larger part than is commonly supposed.

The writer maintains that psychogenetic factors play an essential part in the onset of some mental diseases and that the recognition of this is a distinct step in advance. Biology and psychology should not be bound down by concepts applied to the physical sciences, that is by mechanistic concepts. Purposive activity should be the fundamental working conception.

In conclusion he mentions three possibilities with regard to functional disease:

(1) Diseases which, though involving structural and chemical abnormalities, are of functional origin.

(2) Diseases which are of functional origin and essence, involving no strictly pathological change, but only a disturbance of the quantitative balance of functions.

(3) Mental diseases which are of the mind only and not at all of the body.

The first and second are not only possible but abundantly realized in numerous cases. As to the third,—we must keep an open mind.

A. G. MORPHY

On the Duodenal Reflux into the Stomach in the Course of Gastric Digestion. *Bolton, C. and Goodhart, G. W. The Lancet,* Feb. 11th, 1922.

Boldyref has shown that if one introduces mineral or organic acids of known concentration into the stomach of a dog, the acid diminishes progressively because the liquid is neutralised in the stomach chiefly by the pancreatic juice. This occurs through anti-peristaltic movements because of the irritation of the intestine. It appears to be an auto-regulatory mechanism.

Researches on man have led to the same conclusions, though one does not know exactly when or how the contents of the stomach in the digestive period are neutralised by this reflux of pancreatic juice. The authors have employed the gruel test breakfast and have made gastric

analysis every quarter of an hour. They find that the duodenal reflux is constantly produced, although at varying periods during digestion, and that it is a very important element in the normal stomach and explains variations of the acid curves.

Free hydrochloric acid, if found, usually rises to .2 per cent. then falls abruptly, corresponding to the neutralisation by the alkaline pancreatic juice. Sometimes it rises slowly, due to a cessation of the duodenal reflux from spasm of the pylorus; or again, it may rise continually during several hours, which would seem to imply organic obstruction or spasm of the pylorus. On this evidence, then, the amount of free hydrochloric acid is not a measure of gastric secretion, but rather is the result of two processes—secretion and neutralisation.

The curve of the combined acids varies according to the three types. First, it rises rapidly and continues to rise while the free hydrochloric acid diminishes because the latter is neutralised by the reflux of duodenal juice. In the second type, the curve falls because of the delayed rise of the free hydrochloric acid; and, in the third, type it remains fairly low.

The curve of the total chlorides naturally represents the sum of the two preceding secretions. It is always higher than that of the combined chlorides, and it is this curve which most of all enables one to estimate the activity of gastric secretion.

The writer's conclusions are that the absence or diminution of free hydrochloric acid is of little significance in itself, as the total chlorides may be normal. It does show, however, a very free regurgitation from the duodenum. The type of curve which continually rises for several hours does not necessarily imply hypersecretion, but rather delay in or insufficiency of the pyloric relaxation. The estimation, then, of these various curves permits an opinion as to how and at what hour regurgitations from the duodenum occur. C. F. MARTIN

On the Hysterical Nature of Severe Vomiting in Pregnancy. *Hurst, A. F. The Lancet,* March 18th, 1922.

The writer appears to disagree with those who hold to the theory that hyperemesis of pregnancy is due to increase in the urinary ammonia. W. Williams divides hyperemesis of pregnancy into three groups: (1) Reflex (secondary to some organic disease); (2) Nervous vomiting; (3) Toxic vomiting.

The different diagnoses between these two last, as well as the prognoses, are determined by the amount of ammonia found. Hurst reports the case of a woman who vomited constantly both after her meals and in the intervals between; the tongue was dry, the pulse rapid, and the urine contained 28 per cent. of ammonia and a large amount of diacetic acid. Psychotherapy sufficed to cure the patient and to relieve all the pathological phenomena. The patient gained about 18 lbs. in four weeks. During a later pregnancy, vomiting again occurred, but disappeared in the same way.

Hurst believes that the excess of ammonia and the diaceturia are caused by dehydration and not from intoxication; and hence, he does not believe that these changes are of any value to distinguish the two varieties of hyperemesis. Intractable cases are always due to nervous origin, or rather, hysterical origin, being caused by suggestion and curable by psychotherapy. C. F. MARTIN

The Effects of Alcohol upon Digestion in the Stomach. *Haneborg, A. C. Acta Med. Scand.*, 1921.

The writer finds that the increased secretion of gastric juice following upon small doses of alcohol was not obtained until after the alcohol had been absorbed. It seemed most likely that this increased secretion was due to the generally exciting action of the alcohol on the nervous system. Alcohol was not found to have any effect upon the proteolytic action of gastric juice *in vitro* when the concentration was less than 10 per cent. In higher concentrations, it either reduced the proteolytic action, or prevented it altogether. This may have been due to the precipitation of pepsin by the alcohol. Comparatively large doses of alcohol after a meal constantly promoted secretion, whereas the same amount on an empty stomach disturbed the digestion to a considerable extent.

Under pathological conditions, Haneborg shows that chronic gastritis does not prevent absorption of alcohol by the stomach. The effect of alcohol on patients suffering from hyperacidity or from gastric ulcer was to increase the acidity, the pyrosis and the pain. In cancer, however, the alcohol seemed to relieve the various discomforts, though it did not seem to affect the

secretion of gastric juice. The digestion was promoted by small quantities of alcohol in achylia and chronic gastritis, and in several cases alcohol yielded free hydrochloric acid in a gastric juice where it had previously been lacking. Though small doses of alcohol taken with food promoted digestion in healthy persons, the effect of this small dose under pathological conditions seemed to be largely dependent on individual peculiarities. This was probably due to the fact that alcohol acts through the nervous system, whose receptivity and reactive capacity vary very considerably.

In the course of his investigations, Haneborg has made a very interesting discovery, *viz*, that in healthy persons over the age of fifty, free hydrochloric acid is deficient with a very remarkable frequency. In more than 50 per cent. of persons over that age, the acid was either absent or considerably reduced. In such persons there are no digestive troubles so long as the food is properly composed and prepared, but they are susceptible to attacks of indigestion, which, in certain cases, could be relieved by alcohol provided it does not constitute more than 10 per cent. of the total contents of the stomach. C. F. MARTIN

Relation of Faulty Cultures to Diphtheria Mortality. *O'Keefe, Edward Scott., Boston M. and S. J.*, May 4th, 1922.

Among the causes interfering with a favourable outcome in diphtheria, two are of special significance. One is the failure of the physician to recognize the condition clinically, and the other is his reliance on a negative laboratory finding. A large number of primary cultures as ordinarily taken in true cases of the disease are negative. Swabbing the surface of the lesion is not sufficient. The organisms can be consistently found only within or under the membrane itself. This latter requires a moderately forcible rubbing of the infected area with a strong swab stick.

A. H. MACCORDICK

Erysipelas, Streptococcal Septicæmia. *Erian; A., Practitioner; London*, May 1922.

The writer has studied over 500 cases of erysipelas. The disease may become epidemic like typhoid, but remains longer in the district when once established. Erysipelas of the face may spread over the body, may cause cellulitis and even septicæmia. There may be inflammation of the orbit with exophthalmos, pain in the eyeball, and squint. These eye symptoms readily subside, however, under hot fomentations, and seldom cause permanent disability. Streptococcus septicæmia may arise from erysipelas, the number relatively increasing as the epidemic continues. The prognosis in septicæmia following erysipelas is bad. The early injection of anti-streptococcus serum is of great value. 40 to 50 c.c. may be given as soon as a diagnosis is made and repeated daily until temperature subsides. A. H. MACCORDICK

On Quinidine in Auricular Fibrillation. *Hart, Stuart T. Association of American Physicians, Annual Meeting*, 1922.

Seventeen cases, chosen at random, were treated, of which fifteen had genuine fibrillation. The drug was administered in two preliminary doses of 0.2 gm. each, and one day was allowed to elapse as a safeguard against susceptibility. In favourable cases, a dose of 0.4 gm. was given three times a day, and the drug discontinued when sinus rhythm had been re-established. The results were most satisfactory, and the drug successfully produced sinus rhythm usually within two days from the onset of the therapy.

The writer saw no dangerous sequelæ from the administration of the drug. He advocates the use of quinidine only in those cases where digitalis has not been used at all, say, within the previous few weeks, on the ground that quinidine and digitalis are pharmacologically antagonistic. Quinidine slows the auricle and increases the rate of the ventricle, while digitalis has the reverse effect on auricle and ventricle. C. F. MARTIN

On Various Forms of Endocarditis. *Libman, E. Association of American Physicians, Annual Meeting*, 1922.

The writer classifies types of endocarditis as rheumatic, syphilitic, acute bacterial, sub-acute bacterial and indeterminate. In the rheumatic endocarditis, the specific lesion is the Aschoff body, a perivascular lesion. The bacterial cases are so called because they are due to known bacteria. In the case of the acute variety, the chief organisms are hæmolytic streptococci, pneumococci, staphylococci, gonococci, etc. Of the sub-acute cases, more than 95 per cent. are due to *streptococcus viridans* (anhæmolytic). The indeterminate cases are, for the most part, due to influenza bacillus.

In all these cases, the portal of infection is

mainly due, in the acute cases, to a septic purulent focus. In the sub-acute cases, either a focal infection or intestinal trouble initiates the disease. Libman is of the opinion that the acute cases should all be named according to the etiological agent that is found. Sub-acute cases, however, should be called after the causative factor only until such time as a better scheme of grouping can be developed. C. F. MARTIN

Experiments on the Variability in Susceptibility to Poison Ivy. *Brown, E. D. Arch. of Derm. and Syph.*, June 1922.

The writer considers that different degrees of susceptibility exist, varying even in the same person. But, however different in degree, there seems no real ground for saying that complete immunity exists. It may take anywhere from five hours to eight days for symptoms to appear.

The spread of the eruption does not depend on its conveyance by the hands.

He has never been able to find any involvement of the mucous membranes. One patient even chewed the leaves, and yet the mouth was unaffected. But he has seen cases in which eating of the leaf, as an antidote, gave rise to marked eruption around the anus. And this in his opinion militates against the possibility of desensitization, as the principle is evidently excreted without any absorption by the mucous membranes.

In his own experience and that of certain other observers, susceptibility was increased by successive poisonings. H. E. MACDERMOTT

Erythema Nodosum.—Gueissaz (*Rev. med. Suisse rom.*, October and November, 1921) discusses the following theories as to the etiology of erythema nodosum, which was first described by Willan, (1) The oldest view, that it is a rheumatic manifestation, was maintained by Barthez (1802), Schönlein (1829), and Bouillaud (1840), this theory being founded on the presence of pains in the joints which are almost constant. (2) Writers such as Cruveilhier, Chomel, Tardieu, Grisolle, Trousseau and Germain Sée contest its rheumatic origin, and maintain that it is an independent infectious disease. (3) During the last fifteen years almost all writers have been inclined to regard erythema nodosum as closely connected with tuberculosis. Thus Voyer in 1920, out of 47 cases of erythema nodosum, found in 46 either a tuberculous heredity or stigmata of tuberculosis in the patient. According to Gueissaz erythema nodosum is not a frequent disease. At the Lausanne Policlinic only one case was found among 1,000 cases of all kinds. The disease is most frequent in the north, especially in Scandinavia. At Hamburg the average number of cases is also 1 in 1,000 (Hegler). According to Schulthess at the Zurich Policlinic, out of 80,000 patients, there were 113 of erythema nodosum, or 1.4 per 1,000. Gueissaz found that country folk were almost as frequently attacked as townspeople. Three times as many girls as boys were attacked in his statistics, as in Syme's (vide *British Medical Journal*, April 25th, 1914). In six of Gueissaz's cases several members of the family were attacked. Usually the weaker children were affected, but after the age of 15 the disease was equally frequent among those with a good constitution. Gueissaz's conclusions are as follows: (1) There is a primary specific erythema nodosum which possesses all the characteristic features of an acute exanthem. The proofs of its autonomy are as follows: (*a*) The disease attacks females more frequently than males; it occurs at every age, but is commonest between 5 and 20; it is a definitely seasonal disorder, being most frequent in spring; it attacks all classes of society both in the country and in the town. (*b*) Erythema nodosum is an undoubtedly contagious disease, the pathogenic agent of which is still unknown, but has sometimes its portal of entry in the tonsils. It may occur in epidemic form. (*c*) Erythema nodosum conveys immunity, instances of a second attack being extremely rare; it may develop in persons free from any other infection, but it attacks quite as frequently the tuberculous or rheumatic. (2) Under certain conditions tuberculosis, syphilis, malaria or leprosy may give rise to an eruption resembling erythema nodosum. In tuberculosis in particular a relapsing erythema may occur which at its onset presents the features of erythema nodosum, and in its repeated attacks resembles the erythema induratum of Bazin.—*Brit. Med. Jour.*, January 1922.

News Items

NOVA SCOTIA

The Health Centres clinical activities and some of the field activities of the Massachusetts-Halifax Health Commission, as summarized by the Chief Nurse for July show a total of seven hundred and fifty-six medical and nursing consultations. Of these, one hundred and ninety-five were in the child welfare and prenatal service; one hundred and six in the pre-school age dental service; one hundred and fifty-five in the nutrition classes: four in the posture clinic: sixty-six in the ear, nose, and throat services; sixty-seven in the three tuberculosis clinic services, nineteen of them being in the clinic conducted in the Halifax Dispensary; nine in the skin clinic; sixty in the pre-school age clinic; and ninety-four in the venereal disease clinic.

In summarizing the field work of the public health nurses from the Health Centres of Halifax and Dartmouth, this report sets forth that a total of thirty-four hundred and fifty-seven visits were made in a total of twenty-three hundred and ninety-two homes, in these communities and adjacent thereto. In addition, the visiting housekeeper made one hundred and twenty-seven instructional visits into thirty-six homes where nutrition problems were paramount.

The total number of babies under two years of age receiving medical and nursing guidance total eight hundred and eighty-four. Eighty-eight prenatal visits were made by public health nurses during July.

No deaths occurred among babies with whom the public health nurses are working, and the total death rate among babies for this month is one of the lowest recorded.

Among the multifarious activities of the Massachusetts-Halifax Health Commission, which is conducting a most extensive public health experiment in Halifax and Dartmouth, Nova Scotia (population about 70,000,) its tuberculosis services are quite worthy of special note. During the year six clinics were held by the examiner, Dr. T. M. Sieniewicz, and his associates, two at Health Centre No. 1, two at the Halifax Dispensary, one at Health Centre No. 2, Dartmouth, and one at Tufts Cove, an outlying needy section of Dartmouth. There were 233 separate clinics, in which 422 new cases were examined. Adding these to the 322 cases already on the records, makes a total of 744 under surveillance. A Public Health nurse takes notes at every tuberculosis clinic and carries out in the home the special advice or treatment ordered by the examiner. All home contacts are given a complete examination for tuberculosis. When nutrition problems are paramount, a visiting housekeeper, as well as a public health nurse, makes periodic visits to the home, and the under-nourished children are enrolled in one of the nutrition classes. During the year just completed, 4,261 visits were made by these most essential coadjutors.

During the summer of 1921, the Anti-Tuberculosis League undertook the support of 25 under-nourished children in an open air camp on the the grounds of Health Centre No. 1. Those admitted included for the most part, those children known to have been exposed to open tuberculosis. The camp was a complete success.

The services of the Tuberculosis Examiner as a consultant are at the disposal of the city practitioners. This consulting service is operated on a basis very much like that of Bartlett's, Framingham, and is bringing good results. 148 persons were examined in consultation during the year. The Tuberculosis Examiner delivered a series of lectures in the course of Public Health Nursing, and gave another series of 60 lectures to the third and fourth year medical students of Dalhousie University. His services as a lecturer are available, free, to any club or society. Two lectures were given last year to the students of the normal class of Mount St. Vincent Academy. In June (1922), he delivered an address at the Public Health Congress, St. John, New Brunswick. In April, he was loaned to that city to assist in their case-finding campaign.

It will be seen from the above that in one way or other, a large section of the city is being influenced by the preventive and curative work in tuberculosis undertaken by the Massachusetts Halifax Health Commission; and it is safe to prophesy that the close of their period of existence will show a marked decrease not only in the mortality from tuberculosis but from all preventable diseases.

ONTARIO

At Convocation Hall on June 9th, one hundred and thirty candidates were given the degree of M.B. The following scholarships, fellowships, and medals were awarded:—Faculty of Medicine—The Starr Gold Medal, F. G. Banting; the Starr Silver Medals, F. F. Tisdall, H. B. Maitland; the George Brown Memorial Scholarship in Medical Science, R. H. McDonald; the George Armstrong Peters Scholarship, F. G. Banting; the James H. Richardson Fellowship in Anatomy, W. C. M. Scott: the Charles Mickle Fellowship, H. Cushing; the Ellen Mickle Fellowship, J. E. Bates.

District No. 9 of the Ontario Medical Association, comprising the Districts of Muskoka, Parry Sound, Nipissing, Temiskaming, Sudbury and Algoma, of which Dr. Edgar Brandon of North Bay is Counsellor, held its third annual meeting at Sudbury on Wednesday, August 2nd. After luncheon, at which upwards of fifty sat down as guests of the Sudbury District Medical Society, Dr. R. H. Arthur, Mayor of Sudbury, in a few well-chosen words, welcomed the visitors. At 2.00 p.m., the party set out by motor for Ramsay Lake, a few miles distant from the town, arriving at the picturesque summer home of Dr. W. H. Howey shortly before three o'clock. Here, the following program was presented:—Treatment of the Commoner Dermatoses, by Dr. G. W. Ross, Toronto; Albuminuria of Pregnancy, by Dr. G. W. Smith, North Bay; The Surgery of the Pelvic Organs, by Dr. Fred. W. Marlow, Toronto; The Red Cross and Medical Profession, by Dr. Fred W. Routley, Toronto; Abdominal Emergencies in Children, by Dr. R. I. Harris, Toronto. At 6.00 p.m. the meeting adjourned to partake of a picnic supper which the ladies had kindly provided. A short cruise

about the lake followed. The meeting reconvened at the Nickle Range Hotel in Sudbury, at 8.30 p.m., where addresses were delivered by Dr. E. R. Secord, President of the Ontario Medical Association, Dr. Malcolm MacEachern of Vancouver, and Dr. T. C. Routley, Secretary of the Ontario Medical Association. From point of view of attendance, program, weather, hospitality and goodfellowship, the meeting was indeed a success.

The degree of M.D.C.M. was granted to forty-seven graduates of Queen's University Medical School at the convocation in June of this year. The degree of M.B. is no longer given from this old and well established faculty. The council results show that twenty-seven candidates were successful in passing the examinations of the Ontario Council, eight passed the Dominion Council, and two, both the Ontario and Dominion. The prize list for the year was as follows:—The New York Alumni Association Scholarship ($50.00), for the highest marks in Embryology and Histology of the second year, Quartus Bliss, Kingston(with honour of Faculty Scholarship). A Faculty Scholarship of $50.00 awarded to the student making the highest number of marks on the examinations of the second year, C. Everard Lyght, Hamilton. The Dean Fowler Scholarship ($50.00) for the highest marks on the examinations of the third year, Chas. S. Appelbe, B.A., Parry Sound. A Faculty Scholarship ($50.00) for the highest marks on the examinations of the fourth year, John H. Orr, Kingston. Medal in Medicine, John H. Pilkey, Wexford. Medal in Surgery, C. Merlin Eynon, Ottawa.

The Lambton County Medical Society met at Petrolia on July 12th, in an open air meeting at the Town Hospital. Dr. Gwyn of Toronto addressed the meeting on "Heart disease; its recognition and treatment by the general practitioner."

Dr. Ernest Cullen of Detroit, a graduate of 1903, Toronto, and one of our most promising Canadian surgeons, died suddenly in July, from a gastric hæmorrhage.

The following resolution was passed at the Winnipeg meeting of the Canadian Medical Association:—Moved by Dr. Primrose, seconded by Dr. Marlow, and resolved: "That in order to avoid delays and facilitate prompt publication of material from the various provinces, it be recommended that all such material be sent to each respective Provincal Secretary of the Editorial Board of the Journal, and through him to the Editor-in-Chief."

BRITISH COLUMBIA

Dr. A. W. Kenning is reported convalescent, after his recent illness.

Dr. Douglas W. Graham, formerly of Swift Current, is now engaged in practice in Victoria.

Dr. W. J. C. Tomalin has returned to Victoria after an enforced holiday through illness.

Dr. Irene Barstow-Hudson, formerly of London, England, has commenced practice in Victoria.

Dr. Tillman A. Briggs is now engaged in practice at Courtenay with Dr. H. P. Millard, who is the pioneer medical man in that district.

Dr. David Donald has recently been appointed to the post of School Medical Officer, for Victoria. Colonel Donald was well known in the Medical Corps with the Canadian over-seas forces.

Dr. H. Rundle Nelson, who has for several years been in charge of the Dominion Quarantine Station at William Head, is now in Victoria, and has received the appointment of Radiologist at St. Joseph's Hospital.

Dr. J. F. Brodie, of Vancouver, and Dr. L. K. Poyntz, Victoria, have been appointed to the Executive of the B. C. Medical Association by the Vancouver Medical Society, and the Victoria Medical Society respectively.

The Hon. Dr. Beland, Minister of Health, and Dr. W. C. Arnold, Director of Medical Services of the Department of Soldiers' Civil Re-Establishment, who were in Vancouver on an inspection trip, were entertained at luncheon by the Vancouver Medical Association, on the 3rd of August.

The annual meeting of the Okanagan Medical Society (District No. 4), was held in July, when the following officers were appointed:—President, Dr. Osborne Morris, Vernon; Vice-President, Dr. J. S. Burris, Kamloops; Secretary-Treasurer, Dr. J. W. Arbuckle, Vernon; Representative to Executive of the B. C. Medical Association, Dr. H. H. Murphy, Kamloops; Delegates to August Meeting of the B. C. Medical Association, Dr. F. W. Andrew, Summerland; Dr. H. McGregor, Penticton.

The Victoria Medical Society has always had a keen interest in matters affecting the profession, not only locally, but also those of the Dominion and the provinces. The entire active profession in Victoria and district has subscribed to the B. C. Medical Association. The Victoria Society is to be congratulated on the opening of a new medical library. The new rooms provide not only a library reading room, but a large meeting room as well. Dr. H. J. Wasson, President; Dr. H. M. Robertson, Vice-President; Dr. M. W. Thomas, Secretary-Treasurer, form the Executive of the Victoria Medical Society. The thanks of the Society is due to the energetic Library Committee, of which the following are members:—Dr. Forrest Leeder (Chairman), Drs. Walter Bapty, W. J. Barrett, E. W. Boak, Geo. Hall, A. L. Jones, A. E. McMicking, T. MacPherson, A. W. Kenning, G. C. Kenning, M. J. Keys, H. E. Ridewood.

The Vancouver Medical Association has held several special meetings during the summer months, when the members were addressed by distinguished members of the profession from outside points. On June 21st, Dr. W. E. Gallie, of the Sick Children's Hospital, Toronto, gave an interesting lecture on "Living Sutures," which was illustrated by lantern slides. In July, Dr. Alexander McPhedran of Toronto, held a Clinic at the Vancouver General Hospital, and also gave an address on "The Importance of Physical Conditions in Internal Medicine." On the 21st of July, Dr. William Engelbach, Professor of Medicine at St. Louis University, delivered an address on "The Diagnosis of Diseases of the Ductless Glands," and was followed by Dr. Robt. H. Millwee, of Dallas, Texas, who spoke on "Deep Roentgen Therapy." On August 9th, Dr. Louis Hirschman, Professor of Proctology, Detroit, gave a clinic at the Vancouver General Hospital to the Members of the Association.

GENERAL

Under the title of The Post Graduate School of Neurology and Psychiatry of the District of Columbia, a school for the graduate teaching of diseases of the nervous system has been recently organized in Washington, and will open formally in October. Dr. Wm. A. White, Superintendent of St. Elizabeth's Hospital, is President of the institution; Dr. Tom A. Williams, Vice President; Dr. D. Percy Hickling, Dean of the faculty; and Dr. Daniel D. V. Stuart, jr., Secretary-Treasurer. Two courses of study, elementary and advanced, of six weeks each are to be offered; together with an elective course in special subjects.

The Winnipeg Medical Society offers for competition among the medical men registered in Manitoba, who graduated not earlier than 1917, a prize of $200 to be awarded for the best essay on any subject related to the science or art of medicine. The essay must be in the hands of the Secretary of the Society not later than December 31st, 1922. The Society reserves the right to withhold the prize unless, in the opinion of the judges appointed by the Executive Council of the Society, the essays are of sufficient merit. Address communications to the Secretary, The Winnipeg Medical Society, Medical College, Winnipeg.

The Third Annual Convention of the Canadian Radiological Society was held in Winnipeg in conjunction with that of the Dominion Medical Association, June 20th–24th, 1922. The scientific session lasted for three days and included a series of extremely interesting communications. We had the honour to have present with us and contributing to the program, Drs. Lewis Gregory Cole, Russell D. Carman, B. H. Orndorf, R. H. Stevens, F. S. Bissell, and C. J. Sutherland. The Officers elected for the coming year are:—President, L. J. Carter, Brandon; First Vice-President, Dr. C. W. Prowd, Vancouver; Second Vice-President, Dr. J. C. McMillan, Winnipeg; Third Vice-President, Dr. L. T. Pariseau, Montreal; Secretary-Treasurer, Dr. L. K. Poyntz, Victoria. The Executive Committee is composed of Dr. G. E. Richards, Toronto; Dr. A. E. Walkey, Hamilton; Dr. L. K. Poyntz, Victoria.

The rules and regulations governing the Canadian Register of Technicians established in 1921, were adopted, and Dr. L. K. Poyntz of Victoria, was appointed Registrar and Examiner.

Dublin University on the 4th instant, conferred on Prof. Geo. E. Armstrong, M.D., LL.D., the honorary degree of *Magister in Chirurgia*. The Earl of Middleton and the Lord Chief Justice of Ireland were also recipients of honorary degrees at the same time. It was during the eventful days when the Four Courts were stormed by the Nationals and taken, so that both during the ceremony, and throughout the whole period of the evening banquet, the booming of cannon was interspersed with the sharp crack of almost continuous rifle fire. Prof. Armstrong was strongly advised by friends in England not to go to Dublin during this week, but, as he had promised his friends, he was not to be dissuaded. On attempting to drive on some roads outside the city, on the following day, he was met at short intervals by barriers of fallen trees, telegraph poles and broken agricultural implements of all sorts manned by soldiers, national or irregular, and finally had to turn back. He returned to Montreal on the 16th August.

Obituary

DR. ERNEST KEYES CULLEN

The news of the sudden death, from hæmorrhage of the stomach, of Dr. E. K. Cullen in Detroit on July 5th, after only twenty-four hours' illness, came as a sudden shock to the medical profession throughout Ontario.

Dr. Cullen was a son of the late Rev. Thomas Cullen, a minister of the Methodist Church, well known both in London and in Toronto. He studied medicine in the faculty of medicine, Toronto University and, after graduation in 1899, he acted as house surgeon in Toronto General Hospital and then went to Johns Hopkins Hospital, Baltimore, where he spent eight years in post-graduate work, specializing chiefly in abdominal surgery and gynæcology. In 1912 he settled in Detroit, and soon became associated with the teaching staff of the Detroit Medical College. At the time of his death he was Professor of Gynæcology in it, and was head of the gynæcological department of both Harper and St. Mary's Hospitals.

Dr. Cullen has written many articles for publication, and has frequently addressed medical societies on both sides of the line. In February last he gave a paper in Galt before the South Waterloo Medical Society on "Pneumo-Peritoneum."

Dr. Cullen is survived by a widow and a seven months' old daughter. Dr. Thomas S. Cullen of Baltimore, is his only brother. He was buried beside his parents in the family plot of ground in London, Ont.

Those of us who knew him best will remember him best not only for his surgical skill, but for his kind and genial disposition.

At the Victoria General Hospital in Halifax, Dr. Frederick William Kelly of Bridgewater, died after a comparatively short illness. A graduate of Dalhousie University and also of Bowdoin College, Dr. Kelly first took up his practice of medicine in Chester, and after some years moved to Bridgewater, where he spent the last twenty years of his life in a somewhat arduous practice. Untempted by the prizes which a large city could offer a man of his ability, he pursued his quiet way faithful to every trust reposed in him. His death is deeply regretted, not only by his immediate patients, but also by all in Bridgewater and in the neighbouring country. He is survived by two sons, Mr. Rex Kelly and Dr. Bruce Kelly, both residents of Bridgewater.

ROBIE DUGWELL BENTLEY

The citizens of Truro, and the Medical Profession not only in Nova Scotia were shocked to learn that Dr. R. D. Bentley of Truro was shot on the Main Street of that town within a few yards of his home by an Assyrian whom he had been treating. Dr. Fulton who happened to be on the street near by, at once attended the prostrate doctor, who exclaimed before losing consciousness "He shot me; get that man, he's crazy." The murderer ran across the street to his shoe store, locked himself in, and shot himself. The doctor died within half an hour and the murderer three or four hours later in the local hospital.

Dr. Bentley graduated from Dalhousie University in 1897, and practised for several years in Wallace, Cumberland Co., Nova Scotia, where he had a large practice. In 1915 he settled in Truro. Dr. Bentley's worth as a physician was of a high order. He was a careful and accurate diagnostician, and gained the confidence of all those with whom he came in contact.

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Book Reviews

Surgical and Mechanical Treatment of Peripheral Nerves. By Byron Stookey, A.M., M.D., Associate in Neurology, Columbia University; Assistant Surgeon, New York Neurological Institute; Assistant Professor of Neuro-Surgery, New York Post Graduate Medical School and Hospital. With a chapter on "Nerve Degeneration and Regeneration," by G. Carl Huber, M.D., Professor of Anatomy, University of Michigan. Large octavo, 475 pages, with 217 illustrations—eight in color—and 20 charts. Philadelphia and London, W. B. Saunders Company, 1922. Sole Canadian Agents, The J. F. Hartz Co., Ltd., Toronto. Price $10.50.

This volume may at once be described as a very excellent, complete and painstaking discussion of the subject of peripheral nerve injuries, and their surgical treatment. Of special interest are the special chapters devoted to methods of nerve repair, direct nerve implantation and direct muscular implantation, tubulization, nerve liberation, the technic of nerve suture, and the indications for operation and the time to operate, with a consideration of the causes of failure. The remainder of the work is occupied with a discussion of the injuries of individual nerves and the best means of combating these, with final chapters on nerve tumours, causalgia and amputation neuroma. The book is well written, well printed and exceptionally well illustrated, and each chapter has a very complete list of references attached. The author and publisher are both to be congratulated on their product, and the volume may well be described as of that type of monograph which really plays a useful part in the elucidation of surgical problems. E. R. S.

Artificial Limbs and Amputation Stumps. A Practical Handbook, by E. Muirhead Little, F.R.C.S., Eng., Consulting Surgeon to the Royal National Orthopædic Hospital. Pages viii and 319, with 267 illustrations. Demy 8vo. Price 18s. net. London, H. K. Lewis & Co., Ltd., 1922.

In this handbook the author records the conclusions which have been reached as the result of six years' experience (during the war) in the treatment of amputation stumps at the Royal National Orthopædic and in various Red Cross Hospitals, as well as the review of some 25,000 amputation cases at Roehampton.

The requirements which are characteristic of a good stump are discussed, as well as the conditions which prevent or delay the fitting of a satisfactory prosthesis.

Various forms of prostheses for both the arm and the leg are described, special attention being paid to the "British Official" forms.

It would seem that consideration of these various data should be of extreme interest to the practical surgeon, and it is to be hoped that the experiences gained during the war will tend towards better fitting artificial limbs. Previous to that time, in civilian practice at least, one sometimes thought that it was the part of wisdom to so fashion the stump that it would adapt itself to the standard type of limb available, rather than to take a chance on getting a limb that would suit the individual stump. E. R. S.

An Essay on the Physiology of Mind. By Francis X. Dercum, M.D., Ph.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College, Philadelphia. 12mo, of 150 pages. Philadelphia and London, W. B. Saunders Company, 1922. Cloth, $2.00 net. J. F. Hartz Co., Toronto.

Dercum has given us a most interesting essay, and written it in his usual charming manner, so that one can read a clever summary of the development of the mind from the amœba to man, and feel a real enjoyment in following his able reasoning. He is a firm believer in the two possible laws of the neurone theory, namely, that, in certain conditions, the nerve cell is in a condition of fixation, and, under other conditions, in a state of freedom. Accustomed paths of activity lead to fixation, while the highest cortical neurones are characteristically free. So the systematized delusions are a symptom of the lower or fixation state. An interesting but perhaps ideal view of the emotions places their origin in the ever increasing field of the action of the hormones and toxines of the body. Dercum is here giving voice to his views that the mechanism of mind is definitely physical, and he refuses to discuss the Psyche, while he equally shows his well known antipathy to Freudian views by his bare mention of the latter's dream theories. It is very refreshing to read the views of a physicist, after being saturated by books on sexual determination. G. W. H.

Practical Infant Feeding. By Lewis Webb Hill, M.D. Published by W. B. Saunders & Company, Philadelphia, U.S.A. J. F. Hartz Co., Ltd., Toronto. Octavo, 483 pages, illustrated. Price $5.50.

This book presents to the medical profession, especially the pediatrist, a well written and edited work. The author states in his preface "that the book is practical without being superficial, and scientific without being tiresome." The author throughout has adhered fairly well to his original resolution, although it is probably best suited for the specialist.

The arrangement is good, commencing with the chapter on Physiology and Pathology of digestion, maternal feeding, history of artificial feeding with a detailed discussion of its various phases, and finally ending with clear and comprehensive analyses of the various deficiency diseases. The only regrettable feature is the author's recommendation of top milk and whey mixtures which, outside of Boston, have long been relegated to the past. In spite of this, however, the book is most commendable in all other features, and should find its place in the library of all pediatricians. A. B.

Practical Psycho-Analysis. By H. Somerville, B.Sc., F.C.S., L.R.C.P., M.R.C.S. 142 pages. Published by Bailliere, Tindall & Cox, 8 Henrietta Street, Covent Garden, London, Eng., 1922. Price $2.50. J. F. Hartz & Co., Toronto, sole agents for Canada.

This book on Psychological methods, is one of the most satisfactory compends of Freud's theories that has been published. To the physician who desires to attain a knowledge of the practical side of the sexual basis of the mind, the plan followed here and the clearness of the arrangement and text are both admirable. The writer is an intense Freudian, and not so half-hearted an enthusiast as many of the more recent writers are. It is necessary for every physician to understand these theories, even if he personally decides that they are not tenable; and, in any case, they form a good introduction to the subconscious causes of mental disturbance, which the careful reader will begin to realize, while actually allocating the types due to sexual causes to a small and minor group. G. W. H.

Intensive Treatment of Syphillis and Locomotor Ataxia. By Aachen Methods (with notes on Salvarsan). By Reginald Hayes, M.R.C.S. Fourth edition, revised. 99 pages, 4 plates. Price 4s. 6d. Published by Bailliere, Tindall & Cox, 8 Henrietta Street, Covent Garden, London, England, 1922.

The fourth edition of this book is very interesting to the general practitioner, as he so frequently has many cases of specific disease under his care. Mercury is the

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backbone of the Aachen method, and it is given very unsparingly in courses of 100 to 200 rubbings; and, in preference to arsenic, in syphilis of the nervous system, diarsenol is given in short courses, and the sulphur waters are used as a very important factor of the cure, which makes one wonder why syphilis is not more popularly treated at some of our Canadian sulphur springs. The book should be at the side of every physician, as it repays reading. G. W. H.

Obstetrical Nursing. A Text-book on the Care of the Expectant Mother, the Woman in Labour, the Young Mother and her Baby. By Carolyn Conant van Blarcom, R.N., formerly Assistant Superintendent and Instructor in Obstetrical Nursing and the Care of Infants and Children at the Johns Hopkins Hospital Training School for Nurses. 200 illustrations and 8 charts. New York, the Macmillan Company, 1922.

From a pupil of Miss Nutting of the Johns Hopkins Training School for Nurses, and from one who had been brought on along the highly specialized lines developed in this school by Miss Hampton (Mrs. Hunter Robb), one would only expect the best. It is not too much to say that Miss Van Blarcom has set a standard for those who in the future may wish to put forth a work on obstetrical nursing.

Miss Van Blarcom's experience in nursing allows her to go far afield, and a text book has been produced that should be accepted as an authoritative work of reference. The insertion of Care Melchers's "The Caress," and the quotations of Florence Nightingale and Bishop Brent, is an artistic touch too often omitted in the "dry as dust" volumes put into the unwilling hands of students to-day. Excellently and simply divided into seven parts, the easy English and the splendid reproductions take the interested reader forward, through chapters on anatomy and physiology—Development of the Baby—The Expectant Mother—The Birth of the Baby—The Young Mother—The Maternity Patient in the Community and the Care of the Baby. Excessive technicality is avoided; numerous plates are used to explain anatomical intricacies, and any one interested in this department of nursing will find Miss Van Blarcom's text book amply sufficient for her needs.

The pleasing part perhaps of the whole volume, is the latitude and longitude of her observations. It is hopeful, indeed, to see the insertion of ancient obstetrical prints in a volume intended for modern nurses; the number of clinical pictures take in many and varied conditions; careful consideration is given to many subjects, particularly those subjects which are most essential for the practical nurse; anæsthesia is well discussed. The chapter on nutrition with its excellent pictures of rickets and food deficiency diseases deserves special mention. Prenatal community work and the care of the baby are given very full consideration. The young mother could read most of the less technical part of the work with pleasure and interest. The greatest possible credit is due the author; the publishers are to be complimented upon the appearance and the printing of the volume. N. B. G

Books Received

Diseases of the Stomach and Upper Alimentary Tract—By Anthony Bassler, M.D., F.A.C.P. Fifth Edition, revised and enlarged. Illustrated with 151 engravings and 93 plates. Price $8.00. Published by F. A. Davis Co., Philadelphia, 1922.

Chloroform Anæsthesia—By A. Goodman Levy, M.D., M.R.C.P., with a foreword by Arthur R. Cushny, M.D., LL.D., F.R.S. Price 7s. 6d. net. Published by John Bale, Sons & Danielsson, Ltd., 83 Great Titchfield Street, Oxford House, London, W.1., 1922.

A System of Clinical Medicine—By Thomas Dixon Savill, M.D., Lond. Sixth Edition, Illustrated, 914 pages. Price 28s. net. Published by Edward Arnold & Co., 41–43 Maddox Street, London, W.1., 1922.

Clinical Diagnosis—Case Examination and the Analysis of Symptoms, by Alfred Martinet, M.D., Paris, France, with 895 text engravings and several full-page color plates. Complete in two volumes. Published by F. A. Davis Co., Philadelphia, 1922. Price $14.00 two volumes.

Diseases of Infancy and Childhood—their Dietetic, Hygienic, and Medical Treatment—By Louis Fischer, M.D. Ninth Revised Edition. In two volumes. Volume I: Infant Feeding and Organic Diseases, with 146 illustrations and 37 colored plates. Volume II: Infectious Diseases, Cerebral Diseases; Orthopedic Surgery and Diseases of Eye, Ear, Skin, etc., with 147 illustrations and 43 colored plates. Price, Volumes I and II, $12.00. Published by F. A. Davis Co., Philadelphia, 1922.

Diagnosis, Prognosis and Early Treatment of Poliomyelitis—The conclusions presented by Robert W. Lovett, Boston (*Journal A.M.A.*, May 27, 1922), are based on a study of 5,100 cases of poliomyelitis. No summary of this paper can be given, as it is at best only a summary of a large field. The important points are that the diagnosis must not be made on the history, but on the physical examination; that tenderness is a guide of great importance in diagnosis, prognosis and treatment; that early treatment consists of rest, and that, in the convalescent phase, muscle fatigue is the chief danger and muscle reeducation the chief reliance, and deformities prevent proper function and promote muscular deterioration. Lovett asserts that if these points are borne in mind, many patients can be spared much unnecessary deformity and disability, and we shall be able to take a much more hopeful view of the outcome of poliomyelitis.—*Jour. Am. Med. Ass.*, July 22, 1922.

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Treatment of Tuberculosis.—At a meeting of the Tuberculosis Society of London, on April 24th, there was a prolonged discussion on the therapeutics of tuberculosis. The chair was taken by Dr. F. R. Walters, who in his opening paper emphasized the importance of adequate treatment of slight fever in pulmonary tuberculosis, and suggested that slight attacks were so often neglected because no adequate temperature record was taken. The general practitioner should deal with slight fever far more strictly, and the worst thing that could be done was to tell the patient he must walk about out of doors. In the early stages there should be a combination of rest and fresh air. The patient must be kept warm, while having plenty of cool air to breathe. There should be physiological as well as physical rest, and an absence of all emotional disturbance, worry, or excitement. Treatment causing fatigue should be avoided as much as possible, and in some feverish cases, in dealing with patients in an institution, it might be necessary to restrain the nurse's excessive zeal for washing. It was always a great mistake to tire the patient out. Dealing with various remedies, Dr. Walters said there was a distinct place for creosote, but it should be prescribed rather in a liquid form than in capsules. It should be well diluted and given after meals. In his own experience, continuous inhalations had been rather disappointing. There were cases of irritating cough where the remedy might be very useful, but a great drawback was the fact that patients who had been under fresh-air treatment much resented having what they called "muzzles" put upon them. Speaking of more serious attacks of fever, Dr. Walters said he felt strongly on the question of diet. He had known a anm to lose his chance of recovery because the practitioner who treated him in the early stages of the febrile attack put him on low diet. The patient ought to be fed to a reasonable extent on digestible food, but not on slops. In regard to hæmoptysis, complete rest was of course necessary in severe cases. The patient should be kept in a recumbent position, and not flat on his back. Cool air was essential. Ice to suck was of little value, except as an adjunct to prevent thirst. Silence was important. He was strongly opposed to the routine treatment by morphine. The patient could be quieted in other ways. Inhalations of turpentine proved very useful. In severe hæmorrhage the amount of liquids taken should be restricted to 15 oz. a day. The intermuscular injection of calcium chloride had been found very effective. Dr. Neville Cox read a paper on artificial pneumothorax, which he thought was the greatest advance in the treatment of pulmonary tuberculosis made in the past fifty years. Pointing out how difficult it was to tabulate statistics he claimed that if only 1 per cent. were saved by the treatment it would be well worth while. There were of course the risks of gas embolism and pleural shock. These might be avoided by careful technique. In his own experience since the war he had never used the treatment except when what he might call the classical indications were present—that is, extensive, progressive, apparently unilateral cases, with abundant bacilli and persistent fever. Probably suitable cases would not comprise more than 3 or 4 per cent. in a sanatorium. Dr. Neumann, of the Schatzalp, Davos, said about 12 per cent.—*Brit. Med. Jour.*, April 29th, 1922.

Meat and Scurvy.—The experimental investigations of Vedder of the U. S. Army at Fort Sam Houston, Texas, corroborate previous guinea-pig tests in showing that the administration of considerable amounts of erythrocytes, voluntary muscle, heart muscle and bone all failed to prevent the development of scurvy, or even to prolong the depletion period. An antiscorbutic factor is not present in these tissues in appreciable quantity. On the other hand, various viscera—the liver, lungs, spleen and pancreas—as well as the brain evidently possess antiscorbutic powers, as has long been known for the liver in particular. This demonstration in respect to glandular organs may account for native customs among tribes who live chiefly on a meat diet. Many of them esteem the organs as dietary tidbits. Vedder states that when the plains Indian had been without game over a considerable period, he was accustomed to open the freshly killed bison and eat handfuls of raw liver. It is stated that the Eskimos make a special effort to secure the liver of the seal, and that when hunters had Apache Indians as guides, the usual bargain was for the guides to take all the insides of the deer, leaving the meat for the hunters. Perhaps the seemingly unusual customs become susceptible of a plausible explanation in the light of the newer knowledge of nutrition. Perhaps, further, the distinction between meat, in the sense of muscular tissues, and glandular organs such as the liver and kidney, has not always been made by those who have reported dietary habits in relation to human scurvy.—*Jour. A. M. A.*, June 24th, 1922.